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ABSTRACT

The procedures form the costing component of the National Center for Higher Education Management Systems' "Information Exchange Procedures" (IEP). The IEP are a set of standard definitions and procedures for collecting information about disciplines and student degree programs, outcomes of instructional programs, and general institutional characteristics. The costing component was developed, tested, and evaluated in the early 1970's. This report concerns its recent revision, and considers: (1) the uses and approaches to cost information; (2) historical full-cost study procedures in the individual institution; and (3) the full costing and data management system. Numerous charts and illustrations are used. (MSE)

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PROCEDURES FOR DETERMINING HISTORICAL FULL COSTS

The Costing Component of
NCHEMS *Information Exchange Procedures*

Technical Report 65
Second Edition

PROCEDURES FOR DETERMINING
HISTORICAL FULL COSTS
TECHNICAL REPORT 65
SECOND EDITION

U S DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

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PROCEDURES FOR DETERMINING
HISTORICAL FULL COSTS

Technical Report 65
Second Edition

The Costing Component of
NCHEMS Information Exchange Procedures

September 1977

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PREFACE

The Information Exchange Procedures (IEP) developed by the National Center for Higher Education Management Systems (NCHEMS) are a set of standard definitions and procedures for collecting information about disciplines and student degree programs, outcomes of instructional programs, and general institutional characteristics. IEP has the same general goal as all other NCHEMS projects and products: the improvement of planning and management in postsecondary education. It offers the possibility of improving the quantity and quality of data for internal planning and management problems. Also, in certain instances, IEP may be useful for interinstitutional comparisons.

The costing procedures and definitions recommended in this manual and in other manuals about IEP are "targets" for institutions. Although it is anticipated that many institutions will be able to follow these procedures, some institutions may not have available the required information and others may be able to provide it only at an unreasonable cost. Some institutions may find that only after several years of IEP implementation can data be developed that accurately reflect the characteristics of the institutions.

The costing component of the Information Exchange Procedures was initially developed by NCHEMS staff with guidelines from a task force and steering committee, composed of institutional and state agency representatives. The costing component was tested during 1972-73 by a group of about 60 community colleges, private colleges, and state colleges and universities. The Costing Standards Committee of the National Association of College and University Business Officers (NACUBO) also undertook an extensive evaluation of the costing component, which was published as NACUBO Special Report 76-2, "An Evaluation of NCHEMS Costing Procedures." Based on the NACUBO evaluation, the National Center for Education Statistics (NCES) awarded a contract to NACUBO to work with NCHEMS to revise the costing component of IEP. This second edition of Technical Report 65 is the result of that contract.

The revised document entitled Procedures for Determining Historical Full Costs has been reviewed and approved by the NACUBO Costing Standards Committee, the NACUBO Board of Directors, and the NCHEMS Board of Directors.

This publication is one of four implementation manuals for IEP. The main IEP-related publications and brief descriptions of several of them are listed below:

> Introduction to Information Exchange Procedures: A Guide for the Project Manager, Technical Report 76, provides an overview of the Information Exchange Procedures and describes typical costs and benefits of implementing IEP as experienced by many institutions that have already conducted an IEP implementation. It also contains the formats recommended for display of the IEP data set and a complete glossary of IEP terminology and definitions.
>
> Information Exchange Procedures Activity Structure, Technical Report 63, specifies the structure to be used in collecting institutional data, including detailed examples of an account crossover. This structure is based on the NCHEMS Program Classification Structure, Technical Report 27 (as modified in late 1974), and includes several additional categories that are used during the implementation process and for purposes of reconciliation with institutional records.

Information Exchange Procedures--Outcomes Procedures, Technical Report 66, contains procedures for implementing the outcomes portion of IEP. The outcomes measures and procedures specified therein are based on those developed in the Outcomes project.

Computer software (the NCHEMS Costing and Data Management System) that supports Information Exchange Procedures is documented separately. For information regarding this System, refer to the following documents:

An Introduction to the NCHEMS Costing and Data Management System, Technical Report 55.

NCHEMS Costing and Data Management System--Sample Reports, Technical Report 56.

Account Crossover Module Reference Manual, Technical Report 57.

Faculty Activity Module Reference Manual, Technical Report 58.

Personnel Data Module Reference Manual, Technical Report 59.

Student Data Module Reference Manual, Technical Report 60.

Student Outcomes Module Reference Manual, Technical Report 61.

Data Management Module Reference Manual, Technical Report 62.

ACKNOWLEDGMENTS

Many persons and institutions have contributed to the development of *Procedures for Determining Historical Full Costs: The Costing Component of the Information Exchange Procedures*. The major effort in compiling this second edition was performed by the NACUBO/NCHEMS Costing Committee, chaired by Frederick R. Ford, Purdue University. The other members of the committee were Allan W. Barber, The University of Georgia; Kenneth D. Creighton, Stanford University; and Edwin W. Beach and Richard L. Cutting, State of California Department of Finance. The committee reviewed drafts of the second edition, which were prepared by James R. Topping of the NCHEMS staff and K. Scott Hughes of the NACUBO staff. The second edition also benefited from comments received on a draft at four regional meetings attended by more than 100 persons from over 50 institutions. In addition, the second edition was also reviewed and important contributions made by the NACUBO Costing Standards Committee, chaired by John L. Green, Jr., University of Miami.

Special recognition is reserved for Paul Mertins of NCES, who was the program officer for the NCES contract and who made an important contribution to the second edition. Richard S. Johnson and William Collard, who co-authored the first edition, are also hereby acknowledged.

Thanks are due the NACUBO and NCHEMS secretarial and editing staffs, who patiently and with good humor typed the many drafts and coordinated the production of copy for both editions of this manual.

CONTENTS

Preface i

Acknowledgments v

Figures xi

INTRODUCTION 1

CHAPTER 1: USES OF AND APPROACHES TO COST INFORMATION 1.1

Cost Information in the Decision-Making Process 1.1

Choosing the Appropriate Costing Approach 1.4

Full Costing 1.4

Variable Costing 1.5

Standard Costing 1.6

Summary 1.7

Uses of Costing for Internal Management 1.8

Planning 1.8

Budgeting 1.9

Controlling 1.9

Evaluating 1.10

Summary 1.10

Cost Information for Interinstitutional Comparison 1.11

Methodological Differences 1.11

Functional Differences 1.12

Purpose of Comparison 1.13

Uses of Procedures for Determining Historical Full Costs . . 1.14

Modification of Procedures for Specific Institutional Use 1.16

CHAPTER 2: HISTORICAL FULL COST STUDY PROCEDURES 2.1

Step 1--Develop the IEP Activity Structure 2.2

Step 2--Develop the Instructional Work Load Matrix (IWLM) . . 2.12

Step 3--Cross Over Current Funds Expenditures to the Activity Structure 2.14

Step 3.1--Identify Institutional Expenditures by Organizational Account 2.17

Step 3.2--Adjust Institutional Account Balances 2.17

NCHEMS U Sample Data 2.25

Step 3.3--Develop Instructions (Distribution Percentages) for Crossing Over Academic Area Accounts to the Activity Structure 2.27

Step 3.3a--Develop Distribution Percentages for Academic Area Noncompensation Accounts. 2.29

Step 3.3b--Develop Distribution Percentages for Academic Area Noncompensation Accounts 2.36

Step 3.4--Develop Distribution Percentages for Support Area Accounts 2.38

Steps 4 and 5--Compute Direct Instructional Costs for Disciplines and Student Programs 2.39

Step 6--Prepare for Full Cost Analysis 2.43

Step 7--Allocate Indirect Costs/Calculate Full Costs 2.47

Step 8--Calculate Full Unit Costs 2.51

Step 9--Analyze Components of Cost Information 2.52

Summary 2.56

CHAPTER 3: COSTING AND DATA MANAGEMENT SYSTEM 3.1

Student Data Module 3.3

Student Data Module Overview 3.4

Data Requirements to Develop an IWLM 3.7

Conversion of Student Registration Data to the IEP Activity Structure 3.8

Construction of an IWLM Using SDM 3.10
SDM Control Records 3.14
Additional SDM Topics 3.16
Example of SDM Data 3.19
SDM Reports 3.19
Personnel Data Module 3.23
Personnel Data Module Overview 3.24
PDM Data Requirements 3.28
Conversion of Personnel Data to the IEP Activity Structure 3.33
Construction of Distribution Percentages Using PDM 3.37
Control Records 3.39
Additional PDM Topics 3.42
Example of PDM Data 3.49
PDM Reports 3.49
Account Crossover Module 3.53
Account Crossover Module Overview 3.54
Data Requirements for ACM 3.54
Typical ACM Usage 3.60
The ACM and NCHEMS U 3.63
ACM Control Record 3.71
Example of ACM Data 3.73
ACM Reports 3.75
Data Management Module 3.78
Data Management Module Overview 3.79
The DMM Steps 3.81
Example of DMM Data 3.109
Summary 3.109

APPENDIX

11

LIST OF FIGURES

Figure		Page
1	Implementation Steps for Conducting a Historical Full Cost Study	2.1
2	IEP Activity Structure	2.5
3	Instructional Work Load Matrix	2.13
4	Direct Cost Definition for Information Exchange Purposes	2.16
5	Summary of Crossing Over Current Funds Expenditures to the Activity Structure	2.18
6	NCHEMS U Partial General Ledger	2.26
7	Attaching Academic Area Direct Expenditures to IEP Activity Structure	2.28
8	NCHEMS Faculty Activity/IEP Mapping Conventions	2.37
9	Calculation of Program Costs: Conceptual Overview	2.41
10	NCHEMS U-Capital Cost for Buildings and Land Improvements	2.46
11	NCHEMS U-Capital Cost of Equipment	2.47
12	Recommended Allocation Parameters and Recipient Activity Centers	2.49
13	Components and Explanatory Factors for Direct Unit Costs Within Departments	2.54
14	Summary of IEP Cost Study Procedures and Definitions	2.58
15	Modules of the NCHEMS Costing and Data Management System Used in the IEP Cost Study	3.2
16	Development of an IWLM	3.6
17	Conversion of Student Registration Data	3.9
18	SDM Coding Forms	3.11
19	Preparation of Student Data	3.12

Figure Page

20 Data Required for SDM 3.13

21 SDM1 Control Record 3.14

22 Control and Request Records for Displaying the Contribution Report and Producing Data for DMM 3.15

23 Control Record for Producing the SDM Consumption Report 3.16

24 Unit Weighting Factor Record 3.18

25 Sample SDM Input 3.20

26 SDM Contribution Report 3.21

27 SDM Consumption Report 3.22

28 Personnel Data Module Overview 3.25

29 Crossover of Chemistry Department Expenditures 3.26

30 Sample Faculty Activity Data 3.29

31 Person Identifier Record 3.30

32 Funding Account Record 3.31

33 Person Task Record 3.33

34 Conversion of Personnel Data 3.35

35 PDM Coding Forms 3.36

36 Data Required for PDM 3.38

37 PDM1 Control Record 3.39

38 PDM2 Control Record 3.40

39 PDM3 Control Record 3.40

40 PDM4 Control Record - to obtain reports 3.41

41 PDM4 Control Record - to obtain crossover file 3.41

42 PDM5 Control Record 3.42

43 Restricted Funds Option 3.44

Figure Page

44 Add/Replace Record 3.45

45 Rescale Command 3.47

46 Rescaling Example 3.47

47 Duplicate Record 3.48

48 Sample PDM Input 3.50

49 PDM Consumption Report 3.51

50 PDM Contribution Report 3.52

51 ACM General Ledger Record 3.55

52 Crossover Record 3.57

53 Selective Crossover Record 3.57

54 Mask Record 3.59

55 Typical Run Sequence Through ACM 3.61

56 Receiving Account Record 3.65

57 Crossover Record 3.67

58 Receiving Account Record 3.70

59 ACM1 Control Record 3.72

60 ACM2 Control Record 3.73

61 Sample ACM Input 3.74

62 ACM Contribution Report 3.76

63 ACM Consumption Report 3.77

64 DMM Matrix 3.80

65 DMM Program Functions 3.81

66 DMM Step Summary 3.82

67 DMM Update Record 3.83

68 DMM1 Control Record 3.84

Figure Page

69 Request Control Record 3.85

70 DMM Report Formats 3.86

71 Allocation Request Record 3.87

72 Sending Accounts Record 3.88

73 Receiving Accounts Record 3.88

74 Basis of Allocation Record 3.89

75 DMM Allocation Report 3.91

76 DMM Data After DMM Step 3 . . . . 3.92

77 Discipline Unit Cost Definition Record 3.94

78 Program CID/PID Definition Record 3.94

79 Program Unit Cost Report 3.95

80 DMM Direct Cost Data 3.96

81 DMM Update Transaction Record - Capital Cost Data . . . 3.98

82 DMM Update Transaction Record - Square Foot Data . . . 3.98

83 Arithmetic Transaction Request Record 3.101

84 DMM Allocated Costs and Full Total Cost 3.102

85 Discipline Unit Cost Definition Record 3.103

86 Program CID/PID Definition Record 3.103

87 DMM Full Unit Costs 3.104

88 Partial DMM PID Description 3.105

89 Request Control Record 3.106

90 CID Selection Record 3.107

91 PID Selection Record 3.107

92 Sub-Total Control Record 3.108

93 Sample DMM Input 3.110

INTRODUCTION

Cost information is important in the management of an institution. In performing the functions of planning, budgeting, controlling, and evaluating, institutional administrators rely on cost information and analysis in making financial decisions. In addition to cost information being used for internal management, external funding and policy-setting bodies use cost information in making decisions on the allocation of funds to higher education.

The primary purpose of cost information is to assist internal management in understanding, to the extent possible, the factors affecting the costs of higher education. As more of these factors are understood, decision makers are free to focus on other, nonfinancial aspects.

The manuals on Information Exchange Procedures (IEP) were developed by NCHEMS as a set of procedures with which to compile information about an institution's costs and other descriptive characteristics of a nonfinancial nature, for example, course load data and faculty activity analysis. The costing component of IEP is the subject addressed in this document.

Chapter 1 describes the NCHEMS approach to costing within the context of the broad array of costing techniques available to those who wish to apply them. Chapter 2 provides an overview of the Procedures for Determining Historical Full Costs, and Chapter 3 is a detailed description of the costing procedures.

The Procedures for Determining Historical Full Costs were originally issued by NCHEMS as Technical Report 65, Information Exchange Procedures--Cost Study Procedures. A number of institutions tested the costing procedures and an evaluation was conducted by the Costing Standards Committee of NACUBO.[1] The procedures were then revised jointly by the two organizations. The first edition of Technical Report 65 gave primary emphasis to the exchange of cost information. This document, however, stresses the importance of cost information for internal management purposes, with less emphasis on the interinstitutional exchange of cost data. Chapter 1 of this document compares the full costing approach used by IEP with other available costing approaches. Chapter 1 also describes limitations in using the costing procedures for interinstitutional comparison, stressing that only under strict sets of conditions will one institution's cost data provide meaningful comparison with those of another institution.

In addition to the revisions incorporated in this document, NCHEMS is examining other aspects of the costing procedures, particularly as they apply to complex research universities. At its May, 1975 meeting, the NCHEMS Board of Directors adopted a resolution that the "current information exchange procedures do not adequately describe the complex research institutions in certain critical areas" and cited certain major problem areas, which are:

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[1] "Evaluation of NCHEMS Costing Procedures" (NACUBO Special Report 76-2) (Washington, D.C.: National Association of College and University Business Officers, May 14, 1976).

- Source of Funds: IEP currently does not attempt to identify costs by source of funds. Because of the complex funding patterns of research universities, it is important that this distinction be made.
- Joint Products: IEP requires that departmental activities and therefore departmental costs be disaggregated into instruction, research, and public service components. To a large extent, this is now being done on the basis of primary intent. The interrelationships of these three components have never been satisfactorily examined for purposes of costing. This problem is particularly acute for major research universities.
- Cost Classifications: Costs are now classified in IEP as either direct or indirect. A costing model based on fixed versus variable costs might be more useful for internal management purposes.
- Cost Allocation Procedures: The present cost allocation procedures in IEP are simplified so that they may be implemented by schools that lack sophisticated data systems. These procedures need to be examined in light of the more complex needs of research universities.
- Adequacy of Program Classification Structure and HEGIS Taxonomy: In the past, both the Program Classification Structure and the HEGIS taxonomy have been deficient in areas such as patient care, research, and continuing education. In this project, an effort will be made to develop the necessary measures and procedures to more adequately describe those program areas.

As a result of these perceived inadequacies, the NCHEMS board established a task force of representatives from major universities to address the appropriateness of the IEP procedures for complex research institutions. Until the work of the task force has been completed and a determination made as to whether changes are feasible, the costing procedures will not be appropriate for use by such institutions.

CHAPTER 1

USES OF AND APPROACHES TO COST INFORMATION

USES OF AND APPROACHES TO COST INFORMATION

COST INFORMATION IN THE DECISION-MAKING PROCESS

Cost information and analysis have long been used in managing institutional affairs. The extent to which cost information is helpful in managing institutional affairs requires an understanding of the value the information may have in relation to other existing factors, for example, the quality of academic programs. The many factors affecting the usefulness of cost information and analysis can be described in terms of a continuum.[2] At one end of the continuum, cost analysis is a primary factor in reaching a decision, as in the case of establishing room and board rates or in certain phases of the budget process, such as estimating the impact of inflation on programmatic objectives. In such cases, costs can be clearly identified and associated with a cost objective or service being provided, and prices can be established based primarily on cost. For example, the determination of room and board prices is based primarily on the cost to provide housing and food services.

At the other end of the continuum, analytic results may be merely indicative and therefore play a supplementary role because other important noneconomic variables or factors must be considered. Such instances may be determining student-faculty ratios and tenure policies, or setting course load requirements. Cost information cannot measure what impact a change such as an increase in the student-faculty ratio may have on the quality of instruction. The interrelationships of joint products (instruction, research, and public service) also create difficulties in measuring what impact a change in one activity has on another, such as the impact a decrease in government-sponsored research may have on the graduate instruction program.

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[2] Raymond F. Bacchetti, "Using Cost Analysis in Internal Management in Higher Education" (Washington, D.C.: National Association of College and University Business Officers, January 1977).

Decisions in these areas, unlike setting room and board rates, have major impact on the mission of the institution and on its academic goals, so consideration must be given to factors other than costs, such as content and objectives of the academic program, effect on the faculty, and impact on the educational environment. Therefore, the importance of cost information must be weighed in relation to the nonfinancial factors when the subject under study affects the mission of the institution and its academic goals.

The variation in the relative importance of cost information is caused, in part, by the problem of associating costs with the outputs or benefits of higher education. For example, it is practical and feasible to determine the quality of housing provided to students; consequently, a fair and rational price can normally be determined. But an estimate of the benefits from taking a course or earning a degree relies on subjective judgment, which varies depending on one's perspective. In 1975, NACUBO published the paper "Fundamental Considerations for Determining Cost Information in Higher Education" (see appendix), which codifies the principles for determining cost information in higher education and also addresses this issue of measuring units of output in higher education:

> In commerical organizations, cost generally can be assigned to well-defined and measurable products or services. In higher education, however, the services of instruction, research, and public service may not be measurable or separable in terms of units of output. For example, the instructional process produces an output sometimes referred to as an acquired body of knowledge; however, there is no consensus on how to measure the acquired knowledge as an output. Full-time-equivalent students, student credit-hours, student contact-hours, student headcount, student major by level, and degrees awarded are examples of costing units of service used to measure the instructional process in lieu of output measures. These units are not measures of quality or efficiency.

Because there is no consensus on how to measure acquired knowledge, cost analysts have turned to measuring the cost of the process that provides the *opportunity* to acquire knowledge. For example, institutional administrators may wish to compare the relative cost of providing various student programs at varying levels of instruction. The calculated costs will *not* take into consideration the "value" or "quality" of knowledge passed from professor to student; therefore, no answer is provided as to which student program utilized resources most "efficiently." However, *the comparison of costs does provide the challenge to examine, diagnose, and evaluate why the costs are what they are*. Unit costs of the educational process, combined with other programmatic information, provide administrators with the type of information they can use when deciding feasible and financially sound academic program objectives.

CHOOSING THE APPROPRIATE COSTING APPROACH

Realizing that the usefulness of cost information and analysis varies with the subject matter under study, the cost analyst further has to choose the appropriate costing approach or technique to apply. There are several different approaches to determining costs of educational processes; the selection of the appropriate approach is based on the purpose for which the information is to be used. Three common types of cost approaches useful in higher education are referred to as full costing, variable costing, and standard costing.

Full Costing

Full costing is defined as the accumulation of all direct and all indirect costs attributed to units of service. The full costing approach permits the user of cost information to examine the total cost of units of service as well as the direct and indirect components of cost that make up the full cost.

The full costing approach requires that all direct costs and an appropriate share of indirect costs incurred by or for an organizational unit (such as an academic department) be included as the cost of units of service. These would include costs of such activities as the president's office and operation and maintenance of plant, which are not readily identifiable with the units of service being costed. Though the normal procedure under this approach is first to assign all direct costs to the units of service and then to allocate an appropriate amount for indirect costs, there are many instances where only the direct-cost portion of full costs need be analyzed.

The full costing approach is frequently used in higher education, though often carried out only to the direct cost level. Use of the full costing technique is exemplified in guidelines established by the federal government for determination of indirect costs reimbursable under sponsored projects, though the regulations modify the full costing approach by defining costs that are "allowable" and "unallowable" for reimbursement. The NCHEMS-developed Procedures for Determining Historical Full Costs also use the full costing approach.

Variable Costing

The variable costing approach recognizes (1) those costs that are variable, that is, costs that change when changes occur in service volume or mix, and (2) those costs that remain constant regardless of the number of units of service provided, which are referred to as fixed costs.[3] While the full costing approach encompasses the assignment of all costs regardless of their variability to the units of service provided, variable costing distinguishes between those costs that vary with volume or mix and those that remain fixed. Variable costs include those direct and indirect costs that vary with the number of units of service produced within a given range of activity.

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[3] Variable costing is a broad term and includes other costing techniques referred to as marginal costing and incremental costing. See Daniel D. Robinson et al., "Cost Behavior Analysis for Planning in Higher Education" (Washington, D.C.: National Association of College and University Business Officers, May 1977).

Variable costing is being used increasingly by educational institutions; it has long been used effectively for planning in the commercial sector. Commercial enterprises use the variable costing approach in such applications as determining optimal distribution between capital and labor in the production process, examining optimal production volumes, and evaluating the optimal mix of products to be manufactured.

For educational institutions, and not-for-profit organizations in general, the variable costing approach is more useful in gaining an understanding of how costs (and revenues) may vary as volume (student enrollment, computer usage, square footage) changes, or institutional policies such as tenure, financial aid support, and fund-raising strategies are altered. The variable costing approach asks "what if" types of questions, such as "What if freshman enrollment changes by 10 percent?" This kind of question is often asked when administrators are involved in planning the appropriate courses of action for allocating future resources.

Standard Costing

The standard costing approach uses predetermined unit costs, which are compared with actual costs to identify variances. For example, in analyzing operation and maintenance of plant, variances from standard costs assist in focusing attention on variations from plan or budget and in determining corrective action to be taken. Standard costing is also useful in preparing plans and budgets for both management and those performing the work.

Standard costing is presently used to only a limited extent in higher education. Long used by commercial enterprises as a method of evaluating control over production processes, standard costing has been used in higher education primarily to establish prices for goods and services transferred from one organizational unit of an institution to another. Examples are such items as computer services, physical plant operation and maintenance, and patient care services, where costs can be assigned to a discrete task being performed. The rates or prices calculated on a standard costing approach can be compared with the actual costs incurred, and major differences (variances) can be isolated and examined to determine how efficiently the goods or services are being used.

The standard costing approach has not generally been used for analyzing the costs of instruction, research, and public service. It requires an assumption that the educational process is provided in a fairly standard format, with little variance from a predefined understanding of the mix of resources (level and number of faculty, classroom or laboratory size, computer usage) used in providing instruction or conducting research. Such standardization may have little applicability to the educational process of most institutions.

Summary

The three costing approaches described have application for specific types of decision-making situations. Because the NCHEMS costing procedures are an example of the full costing approach, they are useful for certain types of analyses, but not for others.

To repeat earlier comments, there are no "perfect solutions" to most costing questions. However, the development efforts that have marked the evolution of costing techniques--in higher education and elsewhere--can be expected to continue with a resulting increase in the usefulness of such techniques to higher education administrators, and full costing will continue to have a significant place in cost analysis activities.

USES OF COSTING FOR INTERNAL MANAGEMENT

This section identifies the role of the costing approaches as they apply to the various functions of internal management. Costing can be useful in carrying out the internal management functions of planning, budgeting, controlling, and evaluating.

Planning

The planning process involves the formulation of programmatic goals, an examination of alternative methods and costs to meet those goals, the selection of alternatives that produce the most effective utilization of available resources, and the exploration of ways to increase available resources. The process of selecting among alternative courses of action requires an understanding of the effect on resource requirements of each alternative. If, for example, an institution is considering a change in course requirements for an undergraduate degree program, it has to consider the cost impact due to possible changes in class size, faculty, physical space, and support services.

Variable costing, estimating changes in costs due to varying activity levels and/or differing resource requirements, can provide relevant information in the process of selecting alternatives. In addition, historical cost information derived from the full costing and standard costing approaches provides a valuable perspective on how institutional resources have previously been allocated. Such historical perspective provides a frame of reference for the planning process.

Budgeting

Budgeting is the process of allocating resources (usually for a one-year period) to responsibility centers, which in most instances are organizational units. Similar to the planning process, budgeting involves the examination of alternative courses of action and their effect on the distribution and use of resources.

For certain types of decisions, deans and department heads will find useful an understanding of how changes in such items as numbers of students, course requirements, and student-faculty ratios affect resource requirements. Variable costing provides the relevant information for these types of issues.

The budgeting process involves pricing such items as room and board and such institutional services as computing, physical plant, and utilities. The calculation of prices relies to a large extent on a determination of historical and projected unit costs derived from the use of either the full costing or standard costing approach.

Controlling

The process of controlling the expenditure of resources involves the accumulation of expenditures by organizational unit and type of expenditure (salary, travel, and so forth). Organizational units have the responsibility to use their resources as originally budgeted and to understand why differences from the budget may exist. The appropriate costing approach for establishing control depends on the way the responsibility center's budget has been constructed.

Evaluating

The process of evaluation is a historical examination of how effectively the institution's resources are being used in relation to its academic goals and mission. In the evaluation process, each of the three costing approaches can provide useful information. When appropriate, the standard costing approach can be used to determine how actual costs compare with a predetermined standard, and the causes of substantial variances can then be analyzed. The variable costing approach is useful in those instances where projections may have been developed on the basis of volume or level of activity. In most instances, historical cost analysis, by either the full costing approach or the examination of direct costs, can be used to compare actual expenses to the approved organizational unit or project budget.

Critical to the evaluation process is an understanding of how and where the institution's resources are being utilized. Generally, it is helpful to understand the distribution of costs among academic program areas (by class level, discipline, student degree program) and to specific support areas (student services, institutional support, libraries, and so on). Comparisons such as unit costs of instruction and faculty activity by academic program can assist in the review and evaluation process and, in conjunction with other data, can assist in determining how effectively the institution's resources are being used.

Summary

The varied uses of the costing approaches can be somewhat confusing unless there is a clear understanding of the ultimate use of the information. Each approach has its own set of end objectives for classifying costs and, if matched to the requirements of the subject matter being discussed, can provide meaningful information. In the particular instance of the NCHEMS-developed Procedures for Determining Historical Full Costs, the cost information derived can be useful for gaining a historical perspective of how resources have been allocated to student programs and disciplines. Such data are useful as background material when planning for the allocation of future resources as well as when evaluating the allocation of past resources.

COST INFORMATION FOR INTERINSTITUTIONAL COMPARISON

The process of developing cost information for interinstitutional exchange is difficult and complex. However, there are often instances when it is important to understand how the costs of one institution compare with those of others. Such comparative information is useful for institutional decision makers who are planning and evaluating the allocation of their institution's resources. When one institution's costs are compared with those of others, there must be an understanding of the differences affecting comparability among the institutions. These differences can be classified as methodological and functional. When comparing cost information, it is necessary to attempt to eliminate the methodological cost determination differences so that only functional differences remain to be evaluated.

Methodological Differences

Methodological differences result from costing procedures that vary from institution to institution. Typical examples of methodological differences are the following:

1. The judgments exercised in collecting, estimating, and allocating cost differ, since they often depend on the interpretation of complex situations and on the unique characteristics of individual institutions. For instance, experience has indicated that there are no generally accepted bases suitable for all allocations of indirect cost. The preferred base will vary depending on the institution's organizational structure and operating policies.

2. The definition of direct and indirect cost can be different from institution to institution because of differences in management's ability to identify costs as direct, or because decisions made by management influence how direct costs are defined.

3. The methods or procedures used to accumulate and analyze costs may differ from institution to institution, especially in the case of assessing and assigning costs to faculty effort.

Functional Differences

Functional differences principally result from differences in academic programs and related support activities. Identifying the functional differences among institutions requires an analysis of the characteristics and content of programs and activities being compared. The following examples of functional differences are reasons why one institution's costs may vary from another's:

1. Missions, goals, and objectives differ among institutions.

2. Quality, effectiveness, and delivery of the educational process differ.

3. Organizational structure, activities, and units of service costed differ.

4. Constituents served by institutions have different needs, and therefore require different services and support.

5. Different geographical locations of institutions cause costs for similar items to vary.

6. Distinct differences exist between those institutions which are well established and those which are developing.

7. Economies of scale may vary.

8. Variations in costs occur because of differences in availability of revenues for funding programs.

Purpose of Comparison

Comparability is a relative concept that considers the extent to which units being analyzed are similar or dissimilar. Comparability, then, is contingent on the kinds of questions being asked and the type of comparative analysis being performed. It is possible that comparisons of two similar programs on dissimilar campuses would be appropriate for the purpose of understanding the significant differences between the two programs. It should be recognized that perfect consistency is impossible; the goal should be to have sufficient consistency in order to produce data that are accurate within acceptable limits.

When comparing cost data between or among two or more institutions, it is important to prepare a detailed description of the programs being compared. Areas of concern include the goals of the particular academic unit teaching the discipline or offering the degree program, for example, quality of objectives, areas of specialization, degree requirements, and interdisciplinary relations. The program description should always accompany the cost data in any type of cost exchange. If programs differ significantly in scope and objective, cost comparisons will serve no meaningful purpose.

USES OF PROCEDURES FOR DETERMINING HISTORICAL FULL COSTS

The Procedures for Determining Historical Full Costs developed by NCHEMS calculate the average direct, indirect, and full cost for instructional disciplines and student programs. The average cost per unit can be calculated in terms of full costs or only at the direct cost level. As mentioned previously, for many institutions the costing component of IEP can generate historical cost information, which will provide a valuable perspective on the past allocation and use of institutional resources. It is not the intent to replace other costing methodologies, such as those required by federal government agencies, that are used to calculate indirect costs reimbursable under grants and contracts; the IEP costing component was not developed for that purpose. Also, there may be instances when specialized, ad hoc cost studies would be more economical than establishing a continuous, ongoing cost analysis system.

A number of institutions have incorporated earlier versions of the IEP costing procedures into their evaluation process and have found the resulting information helpful in understanding the cost structure of their disciplines and student programs. In the NCHEMS report Profiles of Management Information Uses (May 1974), twelve institutions highlighted how historical unit cost data were helpful in evaluating the allocation of resources. Typical examples were:

1. A community college analyzed and compared its unit costs in disciplines and degree programs with eight similar community colleges that developed cost figures using standard NCHEMS definitions and procedures. The college found that while its unit costs in some degree programs, such as accounting and physical science, were very similar to those in the other eight institutions, several programs, including architectural technology and chemical technology, were considerably more expensive than those at the other campuses. Each exceptional case was analyzed, and in some cases the other campuses were contacted to ascertain why the variance in unit costs existed. As a result of comparing cost information, the institution has a better understanding of why its costs vary from those of the other institutions.

2. Based on unit cost information and faculty activity analyses derived from the use of IEP, a small private college was able to make a number of decisions that strengthened the financial viability of the institution. The greatest change due to availability of new kinds of management information occurred at the department level. Faculty members found that unit cost data and comparative information gave new clarity and focus to their planning and management decisions and allowed them to better understand the implications of their decisions.

3. A state university used unit cost data and faculty activity analysis to gain a better understanding of the appropriate support level for its social science programs. Academic administrators had been concerned that their undergraduate social

science discipline costs were low compared to other disciplines in the university. Cost data comparisons with three other institutions showed that the disparity between social sciences and other disciplines was very similar at all institutions. Thus, the institution determined that undergraduate social sciences are consistently low-cost disciplines, and perhaps should not be compared to dissimilar disciplines on a single campus.

Modification of Procedures for Specific Institutional Use

Ideally, the validity of comparisons using the IEP costing procedures relies on strict adherence to uniform definitions, procedures, and conventions. However, institutional realities are such that completely comparable data are rarely available. Chapter 2 describes the procedural judgments that must be made; as a result of making those judgments, comparability will necessarily be compromised.

The procedures described in Chapter 2 emphasize the need for uniform definitions and procedures, but offer alternatives in certain instances. For example, three options are described for distributing faculty effort. Institutions exchanging cost information should decide on one of the three alternatives because the methods may not produce comparable results.

When an institution is using the NCHEMS costing guidelines with the intent of analyzing its own costs rather than for exchange purposes, the institution should use definitions and allocation methods that are consistent with its organizational structure, accounting system, and purpose of the study. For example, for comparison purposes, the

IEP costing procedures state that expenses of a central administrative office, as in statewide systems, should be included in the full costs of an institution. This costing guideline need not be followed if an institution is performing a cost study for internal purposes and not for exchange purposes.

A similar modification in the procedures is appropriate for cost information exchanged among institutions within a state or any other group of institutions that wish to compare cost data. The procedures and definitions described in Chapter 2 should be modified to best achieve the purpose of the study.

There are also instances when institutions comparing cost information have found it difficult to conform to the recommended costing guidelines. Testing of the costing procedures has made it possible for NCHEMS staff to identify several reasons why institutions vary from the procedures, thus affecting comparability. These reasons are listed below, with the intent of aiding users to recognize potential problem areas.

1. An institution's operational data system cannot easily provide the required data, and the manual data-collection effort to "adjust" the data would be too great to justify.

2. Occasionally, variations from the recommended procedures are necessary to increase the validity of the cost determination due to better knowledge of the resource use patterns for the institution.

3. The procedures conflict with internal planning and management data.

4. For some institutions the definitions and procedures may be too complex; others may find them too simplistic for their purposes.

The management of an institution should understand how these deviations from the costing guidelines affect the ultimate purpose of the cost information. Each institution or group of institutions needs to examine carefully the costing guidelines and to decide on the set of definitions and procedures that are best for its situation. The definitions and procedures that have been recommended are based on the costing standards established by NACUBO for institutions of higher education. However, the critical factor involved in a cost study, particularly for exchange purposes, is that the methodology be consistent and an explanation or analysis be given of why costs vary among the programs and institutions participating in the study, including recognition of the functional differences of the institutions.

CHAPTER 2

HISTORICAL FULL COST STUDY PROCEDURES

HISTORICAL FULL COST STUDY PROCEDURES

This manual is designed to assist an institution in conducting a historical full cost study; the costing steps presented below are but one way of approaching such a cost study. This manual also serves as the costing component of the NCHEMS Information Exchange Procedures (IEP). In those cases where IEP calls for a specific costing procedure, the procedure is clearly indicated in this manual; otherwise, the procedure is discussed in more general terms. An important element in any successful cost study is defining the implementation process as a series of identifiable steps. The implementation steps described in this manual are listed in Figure 1.

FIGURE 1

IMPLEMENTATION STEPS FOR CONDUCTING A HISTORICAL FULL COST STUDY

- STEP 1--Develop the Activity Structure
- STEP 2--Develop the Instructional Work Load Matrix (IWLM)
- STEP 3--Cross Over Current Funds Expenditures to the Activity Structure
    - 3.1--Identify Institutional Expenditures by Organizational Account
    - 3.2--Adjust Institutional Account Balances
    - 3.3--Develop Instructions (Distribution Percentages) for Crossing Over Academic Area Accounts to the Activity Structure
    - 3.4--Develop Distribution Percentages for Support Area Accounts
- STEP 4--Calculate Direct Instructional Discipline Unit Costs
- STEP 5--Calculate Direct Student Program Unit Costs
- STEP 6--Prepare for Full Cost Analysis
- STEP 7--Allocate Indirect Costs/Calculate Full Costs
- STEP 8--Calculate Full Unit Costs
- STEP 9--Analyze Components of Cost Information

Conceptually, the data and the steps required to conduct a cost study are quite simple. This chapter describes the procedures and definitions of the cost study process, and they will be illustrated as each implementation step is discussed. (It should be noted that these steps need not necessarily be conducted sequentially; if sufficient institutional resources are available, several steps may be performed simultaneously.)

STEP 1--DEVELOP THE ACTIVITY STRUCTURE

Rationale of the Structure

Before an institution embarks on a cost study, two essential questions must be addressed:

1. What is the purpose of the cost study?
2. Who are the intended users of the cost data?

If the purpose of the cost study is to provide management information to the deans and department chairmen for planning purposes, then an activity structure should be adopted that parallels the organizational structure of the college or university. Academic departments and support units would be adopted as the cost centers to which costs are attributed. Or as an alternative, if one wishes to produce program costs, the cost centers may be structured along the lines of the academic program offerings of the institution. In performing a historical cost study, the principal investigator should designate the activity structure and decide on the appropriate level of data collection.

On the other hand, if the goal of the cost study is comparative analysis across several institutions, a common structure should be adopted. Accounting, personnel, student, facilities, and registration systems differ from school to school. To overcome the incompatibilities resulting from these differences, IEP uses a common structure, common definitions and procedures, and several coding conventions to facilitate compatibility. In the cost study portion of IEP, for example, an Activity Structure is used to help ensure that two cost figures compiled separately at two institutions do, in fact, represent the same type of activities. Without a well-defined structure, the account "executive management" at one institution, for example, might include the cost of the president, the comptroller, vice-presidents, and certain other costs. At another institution a similarly titled account might include only the cost of the president's office. To compare the costs of "executive management" in these two institutions would be misleading. The IEP Activity Structure defines the types of functions whose expenditures are to be included in the activity center "executive management" so that, if both institutions use the same definition of "executive management," comparison becomes not only possible but also more meaningful.

Users of IEP data should be aware that the use of the IEP Activity Structure does not automatically or necessarily ensure comparability. For example, within the instructional area two institutions may report data for their graduate-level chemistry disciplines. However, if the primary purpose of one institution is to prepare students to teach high-school chemistry and the other institution is preparing students to be research chemists, their chemistry discipline data probably are not comparable. Cost data should always be accompanied by a description of the programs being compared to help the user in determining if comparisons are valid.

Figure 2 shows the IEP Activity Structure used for data exchange. Much of the implementation process involves the crossing over of institutional student, faculty, and financial data to this structure.

Distinctions Between Disciplines and Student Programs

The next several pages contain a more detailed description of the IEP Activity Structure. That description and the rest of this manual rely on the reader's having a clear understanding of the distinction--as used in this manual--between disciplines and student programs. These terms often have different meanings on different campuses but must have a precise meaning in this manual. Disciplines are related to organizational units and have faculty members, secretaries, supply expenses, and such associated with them. Student program activity centers are student-oriented and, for the most part, have student-related data associated with them (for example, number of headcount students in the Lower Division History program). Any data that may be developed through use of the student outcomes portion of IEP, therefore, are related to student programs. Disciplines offer or contribute credit hours; students in programs take courses or earn the credit hours.

Construction of the IEP Activity Structure

The first digit of the IEP Activity Structure code identifies the highest level of aggregation within the structure. The nine highest aggregate activity centers (or programs) are:

1.0 Instruction
2.0 Research
3.0 Public Service
4.0 Academic Support
5.0 Student Service
6.0 Institutional Support
7.0 Independent Operations
8.0 Scholarships and Fellowships
9.0 Holding Accounts

Figure 2
IEP Activity Structure

Code	Title
1.1.XXXX.XX	General Academic Instruction (delineated to discipline and course level)
1.2.XXXX.XX	Occupational and Vocational Instruction (delineated to discipline and course level)
1.3	Community Education
1.4	Preparatory and Adult Basic Education
2.1	Institutes and Research Centers
2.2.XX00	Individual or Project Research (delineated to program category)
3.1	Patient Services
3.2	Community Services
3.3	Cooperative Extension Services
3.4	Public Broadcasting Services
4.1	Libraries
4.2	Museums and Galleries
4.3	Audiovisual Services
4.4	Computing Support
4.5.XX00	Ancillary Support (delinated to program category)
4.6.XX00	Academic Administration (delinated to program category)
4.7.XX00	Course and Curriculum Development (delineated to program category)
4.8.XX00	Academic Personnel Development (delineated to program category)
5.1	Student Service Administration
5.2	Social and Cultural Development
5.3	Counseling and Career Guidance
5.4	Financial Aid Administration
5.5	Student Auxiliary Services
5.6	Intercollegiate Athletics
6.1	Executive Management
6.2	Fiscal Operations
6.3	General Administrative Services
6.4	Logistical Services
6.5	Physical Plant Operations
6.6	Faculty and Staff Auxiliary Services
6.7	Public Relations and Development
6.8	Student Recruitment, Admissions and Records
6.9	Central Office Operations(*)
7.1	Independent Operations/Institutional
7.2	Independent Operations/Outside Agencies
8.1	Scholarships
8.2	Fellowships
8.3	Provision for Doubtful Student Loans(*)
9.1	Cost of Purchases for Resale(*)
9.2	Current Year's Capital Expenditures(*)
9.3	Rental Expenditures—Buildings and Land Improvements(*)
9.4	Capital Cost—Buildings and Land Improvements(*)
9.5	Rental Expenditures—Equipment(*)
9.6	Capital Cost—Equipment(*)

*Additional Activities not found in the Program Classification Structure but used in the IEP cost study.

It should be noted that the Activity Structure illustrated in Figure 2 is based upon the *first edition* of the NCHEMS Program Classification Structure. A second edition of that document is currently undergoing a field review.

The second digit of the IEP Activity Structure coding scheme is used to break down each of the nine activity centers into more detail. For example, under program 1.0, Instruction, 1.1 identifies General Academic Instruction, 1.2 identifies Occupational and Vocational Instruction, and 1.4 identifies Preparatory and Adult Basic Education.

The next four digits of the code (digits 3 through 6) are used in most cases to identify a specific discipline within one of the activity centers. The seventh and eighth digits of the code define a course level within instructional disciplines. The Information Exchange Procedures specify the use of the Higher Education General Information Survey (HEGIS) taxonomy code to identify disciplines and the use of the codes '.20', '.30', and '.50' to represent Lower Division, Upper Division, and Graduate Level, respectively. An Upper Division course taught in General Physics (that is, general academic instruction) therefore would be coded as 1.1.1902.30.[4] The code for Graduate Level English courses would be 1.1.1501.50, and an Auto Mechanics course in a two-year community college would be 1.2.5306.20 (assuming that all courses in a two-year community college are Lower Division). The term "activity center" normally refers to the lowest level of detail being used. For IEP, an instructional activity center is usually a course level within a discipline (such as Lower Division History). However, most of the noninstructional activity centers use only the first two digits, such as 6.2 for Fiscal Operations. Figure 2 illustrates the level of detail recommended for each activity center.

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[4] The Information Exchange Procedures Activity Structure, Technical Report 63, also contains the complete HEGIS taxonomy. (If an appropriate HEGIS code does not exist for a discipline, an unassigned number in the HEGIS coding sequence should be used.) Institutions producing cost data for internal management purposes may find it preferable to use institutional organizational units and/or codes rather than HEGIS discipline and student program codes to represent instructional area activity centers. For example, if the organizational unit is Finance and Insurance, it may be more meaningful to develop cost data for this unit rather than separating costs into the two HEGIS discipline areas of Finance (0504) and Insurance (0512).

Most of the IEP activity centers shown in Figure 2 are the centers for which costs actually are reported for information exchange purposes. However, in the process of conducting the cost study, it is necessary to use several additional activity centers as temporary "holding accounts." To describe the use of these holding accounts, it is convenient to assign them codes and names for use in this manual. These additional activity centers are:

9.1	Cost of Purchases for Resale
9.2	Current Year's Capital Expenditures
9.3	Rental Expenditures--Buildings and Land Improvements
9.4	Capital Cost--Buildings and Land Improvements
9.5	Rental Expenditures--Equipment
9.6	Capital Cost--Equipment

Much of the cost study involves reorganizing institutional data and attaching these data to the IEP Activity Structure. To avoid inconsistencies in the data-collection process and to aid in understanding the implementation process, it is important for an institution to examine explicitly the total IEP Activity Structure and determine the activity centers that are relevant for it and thus required for that institution's IEP implementation project.

The IEP Activity Structure manual contains an illustrative list of the types of expenditures to be included in each activity center. It should be used when matching the activity center(s) with institutional data.

In addition to the organizationally oriented activities shown in Figure 2, the institution must develop an activity structure for student programs or majors. To help ensure compatibility in the results, the HEGIS taxonomy is also used to identify student programs.

A code is also used to identify the level of the student when student data are being described. Program identifiers for student levels are:

Student Level	Code
Lower Division	.20
Upper Division	.30
First Professional	.40
Graduate I	.50
Graduate II	.60
Other--Specify	.90

A complete student program identifier consists of the prefix 'PRG.' (when using the NCHEMS Costing and Data Management System), the HEGIS code, and the student-level code described above. For example, the Lower Division English student program would be identified as PRG.1501.20.

Data Relating to the Activity Structure

In addition to defining a common activity structure to facilitate producing compatible results, it is important to define carefully the institutional data that will be attached to this structure. Many of these data definitions are presented throughout this manual, but several definitions and implementation considerations that are especially important and affect several of the data-collection steps are highlighted below.

1. Type of Cost Data Produced. There are a number of ways in which "cost" may be defined and in which cost studies may be conducted. The relevant literature contains many types and classifications of costs. Among these are historical costs, projected costs, standard costs, replacement costs, and imputed costs. For a full discussion of these types of costs, the reader is encouraged to read NACUBO's "Fundamental Considerations" paper in the appendix, which contains twelve costing standards that will be referenced at appropriate places throughout the text. The IEP cost study is an example of a cost study that produces average historical full cost data. NACUBO defines historical cost as that which "usually is expressed in terms of the monetary value of economic resources released to pay faculty and staff salaries, to acquire materials and services, and to utilize facilities. Historical cost results from an expenditure involving the disbursement of cash or incurrence of a liability."

2. Accrual Method of Accounting. The two methods of determining historical costs are referred to as the cash basis and the accrual basis. The cash basis of accounting recognizes revenues when cash is received and expenditures when cash is paid, whereas accrual accounting recognizes revenues when earned and expenditures when materials are used and services are performed. To provide valid and consistent historical cost information, college and university accounting standards, as promulgated by authoritative bodies, require that accounting records and resulting financial

statements be based on the accrual method of accounting (Costing Standard #2). For cost determination purposes, the accrual basis should be used. In this regard, an important concept inherent in accounting and costing is materiality, which provides that it is not necessary to recognize certain items of expense and revenue if their omission does not have a significant effect on the final results.

3. Period of Analysis. The IEP cost study should include student, financial, and faculty data for an entire fiscal year for the institution. Data for special sessions such as summer sessions, interim sessions, and evening courses should be combined with data for the regular academic year. For example, cost data for the activity center 1.1.1501.20 will include costs for all Lower Division English courses taught during the fiscal year. Similarly, data for 4.6, Academic Administration, will include data for the academic year, summer sessions, and any other specific sessions.

   Some institutions, however, maintain their academic year data and special session data (for example, summer school) in different formats, different levels of detail, or in other ways that essentially prohibit the combining of data for these different time periods. If either special session student credit hour data or special session cost data are maintained in these "incompatible" forms, the institutions will have to conduct its cost study for just the academic year and report its special session data as footnotes to the cost study. It is hoped that the desire of institutions to prepare more compatible cost data will encourage them to change their data systems to permit the more meaningful fiscal-year analysis.

4. Source of Funds. The IEP cost study is an analysis of expenditures and, in general, should include all expenditures regarded as "current expenses" without consideration of how the expenditures were financed (that is, the source of funds). For example, an expenditure for the nursing program should not be excluded by the fact that the institution received a special nursing capitation grant to support the expenditure. At the present time, the IEP cost study does not attempt to differentiate among funding sources at the detailed unit cost level. This limitation is being studied by a group of major research universities which consider the source of funds a vital component of any cost study.

5. Reconciliation of Results. IEP cost study data should be collected and maintained so that results can be reconciled to official institutional records (Costing Standard #3). In the cost study area it is recommended that no current financial accounting data be "omitted" from the analysis but, as excludable data are encountered, they should be attached to special activity centers for reconciliation purposes. Nonfinancial data, such as number of faculty members or number of credit hours taught, also should be reconciled to official institutional reports (Costing Standard #4).

STEP 2--DEVELOP THE INSTRUCTIONAL WORK LOAD MATRIX (IWLM)

Rationale for the IWLM

The second step in the implementation process is the development of the Instructional Work Load Matrix (IWLM). An IWLM identifies the relationship between disciplines and student programs. This relationship can be viewed two ways. First, it displays the credit hour totals that each discipline (and course level) contributes to each student program (by student level). Second, it displays the credit hour totals that each student program (by student level) draws from each discipline (by course level). Figure 3 illustrates this relationship. Using the data in Figure 3 as an example, the Lower Division Biology discipline contributes a total of 595 credit hours to Lower Division Biochemistry majors, 732 credit hours to Lower Division English majors, and so forth. In total, Lower Division Biology contributes 3050 credit hours. On the other hand, Lower Division Biochemistry majors earn 595 lower division credit hours from the Biology discipline, 708 lower division credit hours from the English discipline, and so forth, and in total earn 2837 credit hours from all disciplines.

This Instructional Work Load Matrix, which relates student credit hours contributed by each instructional discipline to the student programs drawing these credit hours, is the mathematical relationship used for calculating the cost of student programs. In the development of student program costs in IEP, the costs incurred in each instructional discipline are distributed to student programs in proportion to the credit hours contained in the matrix.

Figure 3

Instructional Work Load Matrix

DEGREE PROGRAMS

DISCIPLINES

	Biochemistry Lower Div. PRG.0414.20	Biochemistry Upper Div. PRG.0414.30	English Lower Div. PRG.1501.20	English Upper Div. PRG.1501.30	Psychology Lower Div. PRG.2001.20	Psychology Upper Div. PRG.2001.30	Totals
L.D. Biology (1.1.0401.20)	595		732		1,283	440	3,050
U.D. Biology (1.1.0401.30)		980		840		440	2,260
L.D. English (1.1.1501.20)	708		2,430	315	1,792	220	5,465
U.D. English (1.1.1501.30)		294		2,100		1,430	3,824
L.D. Math (1.1.1701.20)	1,003		1,579		1,024	220	3,826
U.D. Math (1.1.1701.30)		588		630		440	1,658
L.D. Chemistry (1.1.1905.20)	531		729	1,024		110	2,394
U.D. Chemistry (1.1.1905.30)		784		630		660	2,074
Totals	2,837	2,646	5,470	5,539	4,099	3,960	24,551

Data Conventions for the IWLM

The data required to construct an IWLM typically come from an institution's student registration data. The data collected to construct the IWLM should reflect course enrollments as of the cut-off period normally used to determine enrollments for state, federal, or other reporting purposes. For IEP exchange purposes, the standard unit for developing discipline and student program costs is the semester credit hour. Credit hour figures for other than a semester should therefore be converted to equivalent semester credit hours (for example, by multiplying quarter credit hours by 0.667). Because the cost study should include data for the fiscal year, the student registration data used to develop the IWLM should include all course enrollments for all terms.

STEP 3--CROSS OVER CURRENT FUNDS EXPENDITURES TO THE ACTIVITY STRUCTURE

The third step in the implementation process is the assignment of current funds expenditures to the IEP Activity Structure. For cost determination purposes, components of cost may be classified into direct costs and indirect costs. Direct costs are those expenses that are readily identifiable with a final cost objective. For example, where the chemistry department is the cost objective, identifiable faculty compensation and supplies associated with teaching chemistry courses are direct costs of the department.

Indirect costs are those costs not readily identifiable with a final cost objective. Indirect costs of a chemistry department include an allocated portion of the expenses of the president's office, libraries, and operation and maintenance of plant. These costs are incurred for more than one cost objective and are not readily related in a direct fashion to each cost objective.

The distinction between direct and indirect cost has to be judgmental in many cases. A major factor in distinguishing between direct and indirect cost is the level of aggregation of the cost objective. For instance, a portion of the compensation paid to a chemistry department chairman may be considered an indirect cost of a chemistry course. However, if the cost objective is the chemistry department as a whole, instead of the individual courses conducted by the department, the cost of the department chairman is direct.

The determination of whether cost is direct or indirect also is affected by the practicality of assigning costs directly to the cost objective to achieve greater precision. In many situations, much effort is required to relate cost directly to the cost objective, with the results not being materially different from the identification of cost as indirect. Therefore, an important factor for consideration in the assignment of costs is the added expense of identifying costs as direct rather than indirect. The expense of making a precise assignment of costs as direct must be weighed against the precision required in satisfying the purpose for which cost information is used. Other factors affecting the distinction between direct and indirect cost include the individual judgments that must be exercised in classifying costs and the differences among institutions, such as organization structure and operating policies.

To facilitate direct cost comparisons among institutions, a standard definition of direct cost was adopted for IEP. This direct cost definition (see Figure 4) includes only specific objects of expenditure. All other expenditure categories are initially assigned to support activity centers and then are later allocated to the primary activity centers during the full costing steps.

FIGURE 4

DIRECT COST DEFINITION FOR INFORMATION EXCHANGE PURPOSES

- Compensation
    - Salaries
    - Wages
    - Fringe Benefits
- Supplies and Services
    - Consumable supplies and materials
    - Communications (e.g., telephone, telegraph, postal, printing, binding, and reproduction services)
    - Academic computing services
- Travel
- Noncapital equipment

The IEP definition is required to obtain compatibility among institutions because individual institutions may use quite different definitions of "direct cost" in their accounting systems. For example, one institution may identify faculty salaries with an English Department account; assign English Department secretaries, supplies, and materials to a college-wide academic support account; and make no attempt to identify and account for the users of support services such as buildings and grounds, utilities, and the administrative computer. Another institution may attempt to identify the users of all the expenditure types described above and its accounting system may include "direct cost" accounts for English Department faculty salaries, English Department secretarial salaries, English Department charges for buildings and grounds, and so forth. Obviously, to compare the unadjusted English Department "direct costs" for these two schools would provide meaningless results. To produce compatible results, both institutions would therefore make the required adjustments to conform to the IEP definition of direct cost. Institutions conducting a cost study intended primarily for internal management purposes will find it more useful to employ their own definition of direct cost and not perform the IEP direct cost adjustments.

Step 3 is the most difficult of the implementation steps and therefore, for explanation purposes, has been divided into four sections. An overview of these sections is shown in Figure 5.

STEP 3.1--IDENTIFY INSTITUTIONAL EXPENDITURES BY ORGANIZATIONAL ACCOUNT

As mentioned earlier, Step 3 is essentially the crossing over of institutional account balances to the IEP Activity Structure. This process is begun by analyzing activities supported by each account. Step 3.1 is simply the recording of institutional account identifiers and account balances in a form that can be conveniently used in the crossover process. For many institutions, this may consist simply of obtaining a copy of the general expenditures ledger for the fiscal year.

STEP 3.2--ADJUST INSTITUTIONAL ACCOUNT BALANCES

An institution's internal management needs and the fiduciary responsibility of the accounting system usually result in an institutional account structure that does not permit an immediate crossing over of institutional accounts to the IEP Activity Structure. In most institutions, some adjustments are necessary to conform to the IEP definition of direct costs as shown in

FIGURE 5

SUMMARY OF CROSSING OVER CURRENT FUNDS EXPENDITURES TO THE ACTIVITY STRUCTURE

STEP 3.1 Identify Institutional Expenditures by Organizational Account

STEP 3.2 Adjust Institutional Account Balances for:

- Pooled expenses
- Central office expenses
- Reverse certain chargebacks
- Cost of purchases
- Capital expenditures
- Mandatory transfers
- Nonmandatory transfers

STEP 3.3 Develop Instructions (distribution percentages) for Crossing Over Academic Area Accounts to the IEP Activity Structure

a. Instructional Compensation Accounts

(1) For each individual teaching a course, collect for each account from which the individual is paid:

- Fund (account) identifier
- Compensation from this account
- Data concerning each task (usually course taught) performed by the individual that is paid for by this account:
    - Activity units (contact hours) associated with the task (course)

(2) Consider alternatives for distributing faculty effort

(3) Adjust for donated or contributed services of teaching personnel

b. Instructional Non-Compensation Accounts

STEP 3.4 Develop Distribution Percentages for Support Area Accounts

Figure 4. It may be necessary also be identify certain other expenditures and combine them with (or extract them from) the institution's general ledger. These types of other expenditures are discussed below:

Pooled Expenses

The sum of the institutional expenditures for items defined as direct cost in the academic area (according to Figure 4) should be located in the "using department" (academic department) account balances. Institutions with accounting systems that do not charge out all of these expenses must distribute these costs to the "using departments" as part of the determination of direct cost. Examples of expenses that are frequently pooled are secretaries employed at the division or college level and supplies and services that are not charged back to the using department. Other examples (identified on page 45 of the Information Exchange Procedures Activity Structure manual) are expenditures for campus mail, copy centers, duplicating services, mail services, post office, printing services, the publications office, switchboard operations, and telephone service. Another frequently encountered example involves fringe benefits. A number of institutions do detailed accounting for faculty (and other personnel) salaries but record fringe benefits in a pooled account. Because direct cost includes compensation (salary plus fringe benefits), the pooled fringe benefit account must be distributed also.

If actual usage data are not available, expenditures for these pooled expenses must be distributed using some proxy for usage data. A particular institution may decide to distribute these expenses on the basis of other direct expenses, number of personnel employed in each organizational unit, or some other reasonable unit.

Central Office Expenses

Many institutions receive economic benefits from agencies external to the campus, such as the central office in a multicampus system, a state agency, or other coordinating organization. Some of these benefits may be in the form of direct payments for expenditure items such as fringe benefits, utilities, or capital equipment. Other benefits may be in the form of services provided by the agency that the institution would have to fund if they were not otherwise provided. Examples of these services are computer centers, personnel offices, motor pools, purchasing offices, and development offices. Expenditures related to these services plus a proportional share of the administrative expenses of the contributing organization should be included in the IEP cost study. Expenditure estimates for specifically provided services should be relatively easy to identify and should be included in the related IEP activity center. Personnel office expenses would therefore be included in 6.3, General Administrative Services; purchasing office expenses in 6.4, Logistical Services; and so forth. The dollar amount to include for administrative expenses should be based on some reasonable and equitable distribution. An institution in a multicampus system, for example, could use its proportion of the total system expenditures to determine the proportion of central office expenses that should be included in its cost analysis. Expenditures of this type are to be assigned to activity center 6.9, Central Office Operations. Because states differ in the amount and number of services provided to individual campuses, uniform procedures should be adopted before interstate comparisons are made.

Reversing Central Chargebacks

Sometimes certain types of expenses are "charged back" to using departments within an institution. Many of these expenses are defined by IEP as a direct cost within the activity center performing the service (or supplying a product) rather than as a direct cost within the activity center using the service (or product). These chargebacks must be reversed for direct cost analysis if the results of the cost study are to be used for comparison with data from other institutions. Examples of these expenses are:

- Library services
- Audiovisual services
- Administrative data processing
- Transportation services
- Utilities
- Building and ground maintenance
- Building and equipment rental
- Food Service

The purpose of reversing these chargebacks is to obtain compatible direct cost data. Institutions conducting a cost study for internal management purposes may decide that more meaningful data will be produced if these reversals are not made.

Cost of Purchases for Resale

Several activity centers (typically associated with institutional auxiliary enterprises) often have large expenditures for materials intended for resale. Examples are purchases of books and resalable supplies by the bookstore, purchase of food by food services, student union, or dormitories, and expenditures for student insurance and for telephones in dormitory rooms that are paid for by the institution and then charged directly to the student.

These expenses are not to be included in the final results of the cost study but should be attached to the reconciling activity center 9.1, Cost of Purchases for Resale, to permit reconciliation with other institutional expense summaries.

Current Year's Capital Expenditures

The IEP cost study uses a "capital cost" concept to recognize the utilization of capital assets acquired over a number of years. Therefore, the current year's capital expenditures for the new buildings, additions, and improvements to existing buildings and expenditures for capital equipment should not be included directly in the final results of the cost study. As was done with cost of purchases for resale, these expenditures should be identified and assigned to activity center 9.2, Current Year's Capital Expenditures, to permit reconciliation with other institutional expense summaries.

Rental and Lease Expenditures

Rental and lease expenditures for the current period are to be separately identified and assigned to support activity centers. Activity center 9.3 has been reserved for rental expenditures for buildings and land improvements and 9.5 has been designated for rental expenditures for equipment (see Figure 2). These can be treated as pooled expenditures and allocated to final cost objectives during the full costing step (Step 7). Or, if rental expenditures have been directly charged to operating units as a matter of institutional policy, the rental expenditures can be tagged with a 4-digit HEGIS code (9.3.XXXX) indicating the appropriate academic unit utilizing the space or equipment and maintained separately during the direct costing procedures. These rental expenditures can later be reversed to the specific academic disciplines as a part of the full costing procedures. For example, rental expenditures directly charged to the physics discipline would first be assigned to activity center 9.3.1902 and then later allocated to the instruction, research, and public service activities supported by the physics discipline according to the recommended allocation parameter. The latter procedure, of course, provides a more equitable allocation of rental expenditures.

Mandatory Transfers

Mandatory transfers include all transfers from the current funds group that must be made to other funds groups to fulfill a binding legal obligation of the institution. Examples of mandatory transfers from the current funds group are provision for debt service on educational plant and loan fund matching grants. As a general rule, mandatory transfers from the current funds group should be excluded during the account crossover. An exception to this general rule would be the interest incurred on debt related to buildings and capital equipment.

Nonmandatory Transfers

Nonmandatory transfers are those transfers made at the discretion of the institution's governing board. Expenditures incurred from funds made available as a result of nonmandatory transfers into the current funds group should be classified in the appropriate IEP activity centers. Nonmandatory transfers out of the current funds group are not expenditures and therefore should not be included in cost.

Provision for Doubtful Student Loans

Student loans represent a conversion of cash to receivables and as such would not be included in the current funds group. The AICPA audit guide recommends that loans to students be recorded in the loan funds (and therefore excluded from the account crossover).[5] However, if the institution recognizes a provision for losses on student loans or if it records losses after the fact, the provision for loan losses (or actual loan losses) becomes a cost to the institution. As such, it should be assigned to activity center 8.3, Provision for Doubtful Student Loans.

Materiality of Adjustments

When analyzing institutional accounts for purposes of making the adjustments described above, the materiality of the potential adjustments should be considered. If, for example, an institution has total expenditures of $10,000,000, telephone expenses are $80,000, and $5,000 of this amount remains undistributed, it is probably not worthwhile to distribute this relatively small balance. If there are a number of similar "small amounts," however, and their total becomes material, this total amount or some net amount (considering both pooled expenses and potentially reversed chargebacks) should be distributed.

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[5] _Audits of Colleges and Universities_ (New York: American Institute of Certified Public Accounts, 1973).

NCHEMS U SAMPLE DATA

The advantage of using a single set of data for examples was described in the introduction. Information about NCHEMS U is shown in Figure 6. The first two digits of the account structure identify an NCHEMS U organizational unit and the next three digits indicate an object of expense classification. A similar structure exists in most institutions' accounting systems and can be used to advantage in the cost study.

In addition to the expenditures shown in the general ledger, NCHEMS U has $79,500 in fringe benefits paid directly by the central office of the state system to which NCHEMS U belongs. (This amount is calculated as ten percent of the total NCHEMS U salary and wages accounts.)

Examination of the data presented for NCHEMS U in Figure 6 indicates that the following adjustments should be made for this hypothetical institution to adhere to the Information Exchange Procedures described above:

1. Adjust all capital expenditure accounts (those with an object code of "800") by crossing them over to activity center 9.2, Current Year's Capital Expenditures.
2. Adjust account 52-570 Computer Rental by crossing it over to activity center 9.5, Rental Expenditures--Equipment.
3. Adjust account 87-576 Building Rental by crossing it over to activity center 9.3, Rental Expenditures--Buildings and Land Improvements.
4. Adjust the computer chargeback account 21-560 Mathematics by reversing it to the academic computer center (departmental account 52).[6]

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[6] Note: This particular adjustment does not conform to the IEP definition of direct cost, which includes a proportional charge for academic computer support. NCHEMS U, however, has decided to treat academic computing services as an indirect cost.

FIGURE 6

NCHEMS U PARTIAL GENERAL LEDGER

Account		Balance
	English	
10-520	Instructional salaries	$ 43,000
10-523	Secretarial	8,000
10-580	Telephone chargeback	3,000
10-581	Travel	1,000
10-584	Supplies	5,000
		$ 60,000
	Mathematics	
21-520	Instructional salaries	$ 41,000
21-523	Secretarial	3,000
21-525	Student help	1,000
21-560	Computer chargeback	12,000
21-580	Telephone chargeback	4,000
21-581	Travel	500
21-584	Supplies	1,500
21-800	Capital expenditures	3,000
		$ 66,000
	Research Center	
31-523	Secretarial	4,100
31-525	Exempt salaries	29,700
31-529	Nonexempt salaries	6,700
31-584	Supplies	11,800
		$ 52,300
	Community Education	
87-523	Secretarial	$ 3,700
87-525	Exempt salaries	7,200
87-529	Nonexempt salaries	1,700
87-576	Building rental	4,000
87-584	Supplies	2,700
		$ 19,300
	Library	
50-525	Exempt salaries	$ 30,000
50-529	Nonexempt salaries	55,000
50-584	Supplies	7,000
50-800	Expenditure	20,000
		$112,000

	Academic Computer Center	
52-300	Chargebacks	$(12,000)
52-525	Exempt salaries	25,000
52-529	Nonexempt salaries	30,000
52-570	Computer rental	70,000
52-584	Supplies	40,000
		$153,000
	Counseling Center	
44-520	Salaries	$ 47,000
44-523	Wages	14,000
44-581	Supplies	3,400
		$ 64,400
	Dormitories	
63-302	Buildings and grounds chargeback	$ 40,000
63-455	Maintenance	30,000
63-460	Utilities	100,000
63-465	Food Service--Food Purchases	100,000
63-528	Clerical staff	20,000
63-529	Food Service--Nonexempt salaries	60,000
63-580	Telephone chargeback	5,000
63-584	Food Service--Supplies	20,000
		$375,000
	Buildings and Grounds	
54-300	Chargeback to Dormitories	$(40,000)
54-525	Exempt salaries	80,000
54-529	Nonexempt salaries	100,000
54-584	Supplies	100,000
54-800	Equipment purchases	50,000
54-901	Interest--Buildings	20,000
54-902	Interest--Equipment	1,000
		$311,000
	Financial Aid Office	
68-421	Aid to students	$300,000
68-525	Exempt salaries	20,000
68-529	Secretarial salaries	5,000
		$325,000
	Central Services	
71-525	President's salary	$ 25,000
72-301	Telephone chargebacks	(175,000)
72-415	Telephone company payments	140,000
72-529	Telephone nonexempt salaries	53,000
74-525	Controllers office--Salaries	40,000
		$ 83,000

5. Adjust account 63-465 Food Service Purchases by crossing it over to activity center 9.1, Cost of Purchases for Resale.

6. Adjust the $300,000 in aid to students (account 68-421) to activity center 8.1, Scholarships.

7. Adjust the 63-302 Buildings and Grounds Chargebacks by reversing it from dormitories to buildings and grounds.

8. Distribute the $79,500 in fringe benefits that have been paid directly by the state.

9. Distribute the remainder of the institution's telephone expense to using departments. The total telephone expense is $193,000 (the sum of account 72-529 Telephone Nonexempt Salaries and account 72-415 Telephone Company Payments). Already charged back is $175,000, so the remaining $18,000 ($193,000 minus $175,000) must be distributed.

10. Adjust account 54-901, Interest--Buildings, by crossing it over to activity center 9.4, Capital Cost of Buildings.

11. Adjust account 54-902, Interest on Equipment, by crossing it over to activity center 9.6, Capital Cost of Equipment.

Adjustments 8 and 9 relating to the distribution of fringe benefits and undistributed telephone expenses should be made in a manner that approximates the actual usage of these benefits and services. Refer to the description of pooled expenses on page 2.19 for additional information.

STEP 3.3--DEVELOP INSTRUCTIONS (DISTRIBUTION PERCENTAGES) FOR CROSSING OVER ACADEMIC AREA ACCOUNTS TO THE ACTIVITY STRUCTURE

At this point institutional accounts have been adjusted to conform to the IEP definition of direct costs. A few accounts are represented by the IEP Activity Structure (such as 9.1, 9.2, 9.3, and 9.4) but the majority of institutional accounts have retained their original form. Individual account balances, in many instances, have changed but the total for institutional expenditures has not been modified.

Steps 3.3 and 3.4 describe the crossing over of these adjusted academic area accounts to the IEP Activity Structure. Figure 7 repeats the overview of Step 3.3, previously illustrated in Figure 6.

FIGURE 7

ATTACHING ACADEMIC AREA DIRECT EXPENDITURES TO IEP ACTIVITY STRUCTURE

STEP 3.3 Develop Instructions (distribution percentages) for Crossing Over Academic Area Accounts to the Activity Structure

a. Instructional Compensation Accounts

(1) For each individual teaching a course, collect for each account from which the individual is paid:

- Fund (account) identifier
- Compensation from this account
- Data concerning each task (usually course taught) performed by the individual that is paid for by this account:
    - Activity units (contact hours) associated with the task (course)

(2) Consider alternatives for distributing faculty effort

(3) Adjust for donated or contributed services of teaching personnel

b. Instructional Noncompensation Accounts

STEP 3.4--Develop Distribution Percentages for Support Area Accounts

STEP 3.3a--DEVELOP DISTRIBUTION PERCENTAGES FOR ACADEMIC AREA COMPENSATION ACCOUNTS

After the institutional accounts have been adjusted as described in Step 3.2, the next task involves analyzing faculty assignment or faculty activity data to determine how the academic area compensation accounts are to be distributed to the IEP Activity Structure. This is one of the most critical steps in the entire cost study because faculty salaries are typically the largest single expenditure item in the institution's budget. Also, the distribution of faculty salaries to the activity structure affects the distribution of many of the other direct academic costs as well as the allocation of some of the indirect costs. It is therefore of great importance to achieve a rational and equitable distribution of faculty compensation to the various activities of the faculty.

For each individual's activities analyzed, the percentage of the individual's effort devoted to each task described for the individual (such as teaching a Lower Division History course, conducting sponsored research in Physics, or engaging in course and curriculum development for an Upper Division English course) must be calculated. This effort-distribution pattern then is related to the compensation accounts from which the individual is paid, combined with effort patterns for other individuals paid from the same account, and used to assist in crossing over each compensation account.

Three alternative procedures are available for distributing faculty effort; each method has its strengths and weaknesses.

Alternative 1: *Conduct a historical analysis of faculty activities in which the data are provided by the department chairman for each faculty member and reviewed by the appropriate academic dean or the director of institutional research.*

This is a generally recognized alternative for directly distributing faculty cost. The difficulty in this approach lies in relying on a third party to describe faculty activities. Typically, the result is one of using faculty assignments and judgment as the basis for determining the distribution of faculty cost.

Alternative 2: *Conduct a historical analysis of faculty activities in which the data are provided by individual faculty members and verified by the department chairman.*

This alternative for directly distributing cost is more desirable than Alternative 1 because the data are prepared by the faculty member. The validity of the results, however, depends on providing a sufficient definition of responsibilities to each faculty member to eliminate extraneous and improper recording of time and effort. Most critical is the review by the department chairman and others to validate the information provided.

Alternative 3: *Rely on existing institutional records, such as assignment data and payroll records, and distribute faculty cost to instructional course level via an allocation parameter, for example, faculty contact hours or semester credit hours.*

This alternative does not appear to provide sufficient information to arrive at the most accurate distribution of faculty cost to the IEP activity centers. Using an allocation base such as faculty contact hours or semester credit hours fails to recognize the differences in time and effort required to conduct one type of instruction versus another. For example, certain courses require a significant amount of preparation time whereas for other courses the amount of time is minimal. Distributing cost based on contact hours or credit hours treats faculty cost as indirect. Using either of these bases as a means of assignment may result in an erroneous distribution of cost to discipline and program.

While IEP does not take a rigid stance on which alternative to follow, the user should recognize that different procedures for costing faculty activities may produce different cost figures. Therefore, if schools wish to compare their cost information, they should adopt a common procedure in this area. The following guidelines are provided for those institutions that elect to use a faculty survey in the distribution of faculty compensation:

- The survey instrument should reflect an historical account of each faculty member's activities.
- All faculty activities should be traceable directly to the activity structure used for costing.
- The survey instrument should allow each institution to designate which faculty activities are to be costed.
- The survey instrument may be completed (1) by the department chairman on behalf of each faculty member or (2) by the faculty member, the data to be later verified by the department chairman.

- Ideally, the survey instrument should be administered for each academic term (including special sessions) within the fiscal year. As a minimum requirement, the survey instrument should be administered at least once during the fiscal year.[7]

Regardless of the method used in distributing faculty compensation, there should be a reconciliation between the faculty activity analysis and the manner in which a faculty member's salary is charged in the accounting system. Failure to make such a reconciliation will undermine the validity of the entire cost study.

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[7] NCHEMS has done extensive research on the area of faculty activity reporting. Three research reports on this topic are available to the reader:

- Faculty Activity Analysis: Overview and Major Issues (Technical Report 24)--This introductory document discusses the purposes of faculty activity analysis, gives an overview of the issues that must be addressed during the design of faculty activity studies, and provides a review of the literature available on faculty activity analysis (published 1971).

- Faculty Activity Analysis: Procedures Manual (Technical Report 44 This manual presents the faculty activity survey instrument and discusses the following procedural questions involved in conducting an activity survey: when the survey should be conducted, whether the institution should sample faculty or conduct a census, what the survey time period should be, what the alternative methods of administering the survey are, and what the effect of each of these is in the resulting data (published 1973).

- Faculty Activity Analysis: Interpretation and Uses of Data (Technical Report 54)--This manual suggests and illustrates a variety of faculty activity information display formats and analysis techniques including the use of faculty activity data in cost analyses and budgeting. The document also describes in a general sense the specifications of a software package that NCHEMS has developed to process part of the faculty activity data, available as part of the Costing and Data Management System (published 1974).

Common Costs

In processes in which two or more services are provided simultaneously, joint or common costs occur in providing these services. In order to allocate equitably the common cost incurred in a single process to the services provided, a determination must be made of the interrelationship between or among the two or more services involved in a given cost objective. When the services are of similar importance, the process may be referred to as a joint service. Alternatively, when one service is incidental to the other, the process is one of primary/secondary service. This distinction and analysis should be made so that cost incurred in the process can be distributed equitably to the joint services or the primary/secondary services (Costing Standard #10).

Allocation of joint or common costs is by its very nature arbitrary. Therefore IEP has adopted the convention of primary intent when assigning costs to activity centers. If the primary intent of a research project is to produce a set of research outcomes, then the dollars (including the faculty cost) associated with that research project should be assigned to the research program. Any instructional outcomes that may result from that research project are incidental in nature and as such are not recognized for costing purposes. Likewise, a lecture series that was established as an integral part of the art program should be costed as part of the instructional program. The lecture series may also be available to other students and the community at large. However, public or student service is not the primary intent of the lecture series and, therefore, no costs are allocated to the public service or student service programs.

Donated Services

A special costing problem exists for some institutions that have personnel who donate their services to the institution (or whose services are not recorded as an expense in the institution's accounting system). For example, many institutions have military science disciplines where faculty members are reimbursed by a military unit rather than the institution. Other institutions (and particularly those affiliated with religious groups) may have a much large portion of their faculty either donating their services or working for substantially reduced remuneration. In general:

> An imputed value for donated services should be recorded as expenditures by department or division, following the same classification as other expenditures. The value of such services should be determined by relating such services to equivalent salaries and wages (including the normal staff benefits such as group insurance and retirement benefits) for similarly ranked personnel in the same institution of similar institutions. An imputed value for donated services should be recorded only if all of the following circumstances exist:
>
> 1. The amount of such donated services is significant when compared to the total expenditures of the reporting entity.
> 2. The services performed are a normal part of the institution's programs or supporting services and would otherwise be performed by salaried personnel.
> 3. The organization exercises control over the employment and duties of the donors of the services.
> 4. The organization has a clearly measurable basis for determining the value of such services.[8]

Another example of donated services is closely related to the examples mentioned above. In many institutions an individual in an administrative or support position will teach a course and a transfer of dollars from the individual's main organizational unit to the instructional unit will not be recorded in the accounting records. However, for IEP purposes, some cost for this instruction should be attributed to the course if that cost is material. If the individual's regular assignments are reduced to recognize the teaching of the course, then an appropriate proportion of the individual's compensation should be crossed over to the instructional area. If the individual's regular workload is not reduced, then an imputed value for donated services should be assigned according to the intent of this section.

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[8] Report of the Joint Accounting Group (Boulder, Colorado: NCHEMS at Western Interstate Commission for Higher Education, 1974), pp. 31-32.

Work/Study

The total cost (institutional contribution plus state and/or federal contribution) of work/study students should be included as a direct cost in the activity center in which these students work. For example, the entire work/study compensation of an assistant who is working in the Mathematics Department should be crossed over to that instructional area. If a single work/study account is maintained for the entire institution, it may be necessary to distribute the balance of this account to all (or the appropriate) organizational units in the same way that other pooled expenses are distributed.

Costable Faculty Activities

All institutions--and particularly those that use a faculty activity analysis--must decide which faculty activities the institution is willing to "support" in the cost study, that is, which activities the institution will recognize as cost objectives and worthy of faculty compensation. While decisions relating to instructional and research activities are usually simple, it is not always as clear when faculty compensation should be crossed over to other activity centers. Examples of this include crossing over a portion of the faculty compensation to 3.2, Community Service, because a faculty member attended a Rotary luncheon or to 4.8, Academic Personnel Development, because of attendance at a professional meeting. Figure 8 indicates some IEP conventions, but many institutions will have to make a number of similar decisions that are not detailed in this figure.

STEP 3.3b--DEVELOP DISTRIBUTION PERCENTAGES FOR ACADEMIC AREA NONCOMPENSATION ACCOUNTS

Ideally, all of an institution's noncompensation expenditures that are included in the IEP definition of direct cost, such as supplies and travel, can be identified with the organizational unit benefiting from the expenditure and the related account can be crossed over to the corresponding IEP activity center.

In some situations, however, the institution's accounting system does not attempt to record these actual usage data. In many institutions, for example, a faculty member paid by the English Department but teaching a course in the Mathematics Department will use English Department secretaries to prepare course materials, will use English Department supplies and materials, and will charge the English Department for photocopies and other similar expenses. This charging scheme may be particularly prevalent when faculty members teach courses in instructional areas that are not also organizational units--for example, freshmen seminars, interims, or interdisciplinary courses. If

Figure 8

NCHEMS Faculty Activity/IEP Mapping Conventions

Faculty Activity*	IEP Activity Center	Comments
A.1 Scheduled Teaching	1.1.XXXX.XX General Academic Instruction 1.2.XXXX.XX Occupational & Vocational Instruction 1.3 Community Education 1.4 Preparatory & Adult Basic Education	Department and course numbers can be used to determine the specific IEP activity center codes.
A.2 Unscheduled Teaching		To be distributed proportionately across all scheduled teaching activities.
A.3 Academic Program Advising		To be distributed proportionately across all scheduled teaching activities.
A.4 Course & Curriculum Research & Development	4.7.XX00 Course and Curriculum Development	Discipline codes should be maintained at the 2-digit HEGIS level.
B.1 Specific Projects	2.1 Institutes and Research Centers 2.2.XX00 Individual or Project Research	Research activities funded through a formal research organization should be coded 2.1. Research activities managed by an academic department should be coded 2.2.XX00 (with discipline distinctions maintained at the 2-digit HEGIS level).
B.2 General Scholarship and Professional Development	4.8.XX00 Academic Personnel Development	Discipline codes should be maintained at the 2-digit HEGIS level.
C.1 Student-Oriented Service	5.3 Counseling and Career Guidance	Other student service activities will need to be coded on an exception basis.
C.2 Administrative Duties	4.6.XX00 Academic Administration	Discipline codes should be maintained at the 2-digit HEGIS level.
C.3 Committee Participation	4.6.XX00 Academic Administration	Discipline codes should be maintained at the 2-digit HEGIS level.
D Public Service Activities	3.2 Community Services	Other public service activities will need to be coded on an exception basis.

*Complete definitions and examples of these faculty activities can be found on the NCHEMS Faculty Activity and Outcomes Survey form.

the amount of this "cross teaching" is substantial, the institution should consider allowing noncompensation expenditures to be crossed over to the IEP Activity Structure in the same manner as related compensation accounts. The English Department supplies and services account would, therefore, "follow" English Department compensation, the Mathematics Department travel account would "follow" the Mathematics Department compensation account, and so forth. More specifically, if four percent of the English Department compensation general ledger balance is to be crossed over to Lower Division Mathematics, then four percent of the English Department's supplies and services expenses would be crossed over to Lower Division Mathematics also.

A participating institution should review its accounting practices to decide on a general crossover approach for academic area noncompensation accounts and then look for individual situations that may suggest deviations from the general approach.

STEP 3.4--DEVELOP DISTRIBUTION PERCENTAGES FOR SUPPORT AREA ACCOUNTS

Finally, the institutional accounts for the support organizational units, such as physical plant, library, and president's office, must be crossed over to the IEP Activity Structure. Because of adjustments made in Step 2, each organizational unit should now have related to it only those expenditures that conform to the IEP definition of direct cost. This step then involves analyzing the function(s) performed by each organizational unit and using the IEP Activity Structure manual to determine which IEP activity center the expenditures should be crossed over to. Using NCHEMS U data, for example, the president's office would be crossed over to 6.1, Executive Management; the library to 4.1, Libraries; buildings and grounds to 6.5, Physical Plant; and so on.

If an organizational unit's activities are in more than one IEP activity center, its expenditures should be separated and crossed over to the appropriate activity centers. For example, if the business manager also serves as the personnel manager, then a portion of the unit's expenditures should be crossed over to 6.2, Fiscal Operations (to reflect the business manager function) and a portion should be crossed over to 6.3, General Administrative Services (to reflect the personnel function).

STEPS 4 AND 5--COMPUTE DIRECT INSTRUCTIONAL COSTS FOR DISCIPLINES AND STUDENT PROGRAMS

One primary objective of the cost study is to develop direct and full unit costs for disciplines and student programs within General Academic Instruction (1.1) and Occupational and Vocational Instruction (1.2). Costing units are measures reflecting the activities or outcomes of cost objectives, and bear a relationship to the cost incurred. In commercial organizations, cost generally can be assigned to well-defined and measurable products or services. In higher education, however, the services of instruction, research, and public service may not be measurable or separable in terms of units of outcome. For example, the instructional process produces many outcomes--one of them being an acquired body of knowledge; however, there is no consensus on how to measure acquired knowledge as an instructional outcome. Full-time equivalent students, semester credits, student contact hours, student headcount, student major by level, and degrees awarded are examples of costing units of service used to measure the instructional process in lieu of outcome measures. These units are not measures of quality or efficiency.

For purposes of information exchange, the recommended unit is the semester credit hour, or its equivalent, differentiated by academic program and student level and by discipline and course level. Because the semester credit hour is the basic building block of the Instructional Work Load Matrix and because the IWLM can be viewed from two dimensions, two separate units emerge from the IWLM--row totals and columnar totals (see Figure 3). The row totals are referred to as discipline semester credits and are used in computing discipline unit costs. The columnar totals are referred to as program semester credits and used in computing program unit costs. It is from this latter measure that cost per FTE student, and ultimately cost per degree, can be computed. IEP, however, does not include a standard definition for an FTE student, nor does it recommend procedures for calculating degree costs. NCHEMS, in an earlier study, found there was too much variability in the manner in which institutions define full-time equivalency to make a standard recommendation.[9] Therefore, if a number of institutions wish to exchange cost data based on an FTE student unit, they will first have to agree on a common definition for each of the student levels included in the cost study.

Direct unit costs are usually derived before full unit costs. Conceptually, the process for calculating direct unit cost is illustrated in Figure 9. Various data and calculations are illustrated by circled numbers, which are described below.

① All instructional expenditures must be crossed over to the IEP activity structure, as discussed earlier in this manual.

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[9] Marilyn McCoy, Report of a Survey of Higher Education Institutional Practices Related to the Definition of Full-Time Equivalent (FTE) Enrollment (NCHEMS: Boulder, Colorado, 1973).

Figure 9

Calculation of Program Costs
Conceptual Overview

Institution's Accounting Data Attached to IEP Activity Structure ①

1.1.0401.20 Biology Discipline	$ 20,000
1.1.0404.20 Zoology Discipline	$ 15,000
1.1.xxxx.xx Other Discipline	$ 90,000

Institution's Instructional Work load Matrix ②

	Biology Program	Zoology Program	Totals
1.1.0401.20 Biology Discipline	1,000	1,000	2,000
1.1.0404.20 Zoology Discipline	600	400	1,000
1.1.xxxx.xx Other Discilplines	2,000	1,000	3,000

Calculation of Discipline Unit Costs ③

Total Expenditures		Total Credit Hours		Discipline Unit Costs
$ 20,000	÷	2,000	=	$ 10
$ 15,000	÷	1,000	=	$ 15
$ 90,000	÷	3,000	=	$ 30

—Ⓐ→

Calculation of Program Costs ④

—Ⓐ→

	Biology Program	Zoology Program
Biology Discipline	1,000 × $ 10	1,000 × $ 10
Zoology Discipline	600 × $ 15	400 × $ 15
Other Disciplines	2,000 × $ 30	1,000 × $ 30
Totals Credit Hours Cost	3,600 $ 79,000	2,400 $ 46,000

Calculation of Program Unit Cost ⑤

Total Program Cost		Credit Hours		Program Unit Cost
$ 79,000	÷	3,600	=	$ 22

② Illustrates the need for an Instructional Work Load Matrix (IWLM). This matrix provides student credit hour information that must be attached to the same activity structure as expenditure data.

③ Illustrates the calculation of discipline direct unit costs. This is done by matching the expenditures and total student credit hours with the same activity center codes and dividing the student credit hours into the expenditures. In the example, Lower Division Biology courses cost $20,000 and 2000 credit hours were provided to the students. The unit cost (average) for Lower Division Biology discipline is $20,000 divided by 2000 credit hours, or $10 per credit hour.

④ and ⑤ Illustrate how direct program unit costs are derived. This involves multiplying the discipline unit costs by the credit hours in each program, summing this product for each discipline contributing to a program, and dividing these program costs by the respective total credit hours taken by all students in each program. For example, the direct cost of teaching a Lower Division Biology major is calculated by summing three components (1000 X $10), (600 X $15), (2000 X $30), equaling $79,000. The total number of credit hours taken by all Lower Division Biology majors is 3600. This value is obtained by summing a column in the IWLM. The average cost per program credit, then, is found by dividing $79,000 by 3600, equaling $22 per credit hour. (The total cost of all credit hours taken by students in a program--$79,000 in this example--is also useful information to many users of IEP data.)

STEP 6--PREPARE FOR FULL COST ANALYSIS

Preceding sections have described the data and steps required to produce total direct cost and direct cost by unit of instruction data for both course levels within disciplines and student levels within student programs. The next step in the implementation process is developing an additional set of data to be used in the full cost analysis. This data set describes capital cost for buildings and land improvements and capital cost for equipment.

Capital Costs

In analyzing the cost of operating and maintaining an institution, some recognition must be given to the large investment of capital assets (Costing Standard #11). To charge a discipline or student program with capital expenditures made during the current period would likely cause extreme fluctuations in cost data from period to period. To reflect capital asset consumption and utilization more accurately, the concept of capital cost is used in the IEP cost study. Basically, capital costs represent a valuation placed on the services provided by buildings, land improvements, and equipment owned and used by an institution. The calculated capital cost consists of a use charge or depreciation (for capital assets owned by the institution), and actual interest incurred during the period for all debt related to capital assets.

Note that capital costs are not calculated for land, rare book collections, objects of art, and other capital assets that have permanent value and therefore do not depreciate. Books and periodicals may be treated as a capital asset and depreciated over their estimated useful life or, if expenditures for these items do not fluctuate materially from year to year, they can be treated as a direct cost of the library.

Capital Cost of Buildings and Land Improvements

The capital cost for buildings and land improvements consists of the following components:

1. An annual use charge that reflects the institution's utilization of its buildings and land improvements. This may be one overall rate that an institution can apply to the total cost of all of its buildings and land improvements or it can be a combination of rates that better reflect the remaining lives of the capital assets and the institution's policy toward the maintenance of its capital assets. As an alternative, the institution can maintain detailed depreciation records for each type of class of capital assets owned by the institution. The depreciation rate established in each case should be based the estimated useful life of the asset(s) and should take into consideration such factors as type of construction, potential obsolescence, and the institution's renewal and replacement policies. In no instance should the sum of the annual depreciation charges exceed the original acquisition cost of the capital asset. An important difference between the two methods is that a use-charge rate can be applied to a particular building or group of buildings as long as that building is in existence, while under the depreciation method the time period is limited to the estimated useful life of the building. If an institution has not established a policy regarding use charges or depreciation guidelines, IEP recommends an overall annual rate of two percent, based on an estimated useful life of fifty years for buildings and land improvements.[10]

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[10] The use-charge rates recommended for use in IEP are based on the Capital Cost Study conducted by John Powel and the Operating Capital Cost Study conducted by Dallas Fox, Dan Voich, Jr., and Jim Howell.

2. Interest incurred during the current period for debt on buildings and land improvements. The recorded interest should represent interest incurred on the accrual basis during the year as opposed to an imputed interest rate on the investment in the capital assets. If a separate state agency is responsible for the state's bonding authority and, consequently, no interest expenditures are recorded in the institution's financial records, an adjustment should be made at this point to reflect an equitable amount of interest expense.

The total capital cost for buildings and land improvements should be assigned to activity center 9.4, Capital Cost--Buildings and Land Improvements.

The calculation of the total capital cost for buildings and land improvements for NCHEMS U is illustrated on the following page. Assume that the property inventory records for NCHEMS U indicate a total original cost value of $15,000,000. Using this value and the general ledger data from Figure 6, the calculation of capital cost for buildings and land improvements is shown in Figure 10.

Capital Cost of Equipment

The calculations to determine the capital cost of equipment parallel those made for buildings and land improvements. The depreciation or use charge rate is again flexible, depending on institutional policy. If a policy does not exist in this area, IEP recommends a ten-percent rate, reflecting an estimated useful life of ten years for capital equipment. If the institution

FIGURE 10

NCHEMS U--CAPITAL COST FOR BUILDINGS AND LAND IMPROVEMENTS

	Original Cost of All Buildings and Land Improvements	$15,000,000
Multiplied by:	Annual Use Factor	X .02
		$ 300,000
plus:	Current Year's Interest on Buildings-- 54-901 Interest on Buildings	20,000
Activity Center 9.4	Capital Cost for Buildings and Land Improvements	$ 320,000

does not maintain a capital equipment inventory, one can easily be constructed by calculating the total cost of all capital equipment purchases within the last ten years and then multiplying this amount by ten percent to derive a capital equipment use charge. This has the effect of normalizing the institution's last ten years of equipment expenditures. Salvage value should be recognized on major equipment items if the amounts are material. Provision can be made to departmentalize equipment expenditures by calculating a separate use charge for each department and assigning it a unique four-digit HEGIS code, 9.6.XXXX. This procedure, while more complicated, would allow the institution to differentiate equipment costs across its various departments.

Figure 11 illustrates the calculation of the capital cost of equipment for NCHEMS U.

FIGURE 11

NCHEMS U--CAPITAL COST OF EQUIPMENT

Year	Capital Expenditures for Equipment
1974	$ 73,000
1973	15,000
1972	19,000
1971	60,000
1970	12,000
1969	20,000
1968	15,000
1967	19,000
1966	18,000
1965	20,000
TOTAL	$271,000
Multiplied by: Annual Use Factor	.10
	$ 27,100
Plus: Current Year Interest on Equipment-- 54-902 Interest on Equipment	1,000
Activity Center 9.6 Capital Cost--Equipment	$ 28,100

STEP 7--ALLOCATE INDIRECT COSTS/CALCULATE FULL COSTS

The seventh step in the historical full cost study procedures is the allocation of indirect costs to final cost objectives. The bases of allocation of indirect cost should involve the use of those quantitative measures that best represent the relationship of cost to the cost objective, with the result that indirect costs are equitably distributed. There are instances when the most equitable distribution may not be the most practical, both in terms of time and related expense involved in collecting and tabulating quantitative measures. In such cases, the most practial measure should be selected, provided the results are not materially different (Costing Standard #9).

The Information Exchange Procedures recommend a set of allocation parameters to be used as the basis of allocation when actual usage data are not available. These recommended parameters and the recommended recipient final cost objectives for each support activity center are shown in Figure 12. As shown in this figure, for example, the cost associated with 6.5, Physical Plant Operations, is allocated to all final cost objectives using assignable square feet as the allocation parameter. To aid in understanding this process, it should be recognized, for example, that if the total assignable square feet associated with Lower Division Biology is twice the total assignable square feet associated with Upper Division English, then Lower Division Biology will receive twice as many allocated dollars from Physical Plant Operations as will Upper Division English.

Although an allocation parameter is recommended for each support activity center, actual usage data should be used whenever possible. Also, if an institution believes that some other allocation parameter better reflects actual usage, that parameter should be used in place of the recommended parameter. Any deviation from the recommended procedure should be documented and disclosed to any users of the data (Costing Standard #12).

Figure 12

Recommended Allocation Parameters and Recipient Activity Centers

				Recipient Activity Centers		
	Activity Center	Suggested Parameter	Alternative Parameter	Instruction (1.1 and 1.2 only)	Instruction, Research & Public Service	All Eligible Final Cost Objectives*
1.0	Instruction	Final Cost Objective*				
2.0	Research	Final Cost Objective*				
3.0	Public Service	Final Cost Objective*				
4.1	Libraries	Direct Costs	Special Studies		X	
4.2	Museums & Galleries	Direct Costs	None Specified		X	
4.3	Audiovisual Services	Actual Usage Data	Direct Costs	X		
4.4	Computing Support	Actual Usage Data	Direct Costs		X	
4.5	Ancillary Support	Actual Usage Data	Direct Costs		X	
4.6	Academic Administration	Direct Costs	None Specified		X	
4.7	Course & Curriculum Development	Direct Costs	None Specified	X		
4.8	Academic Personnel Development	Direct Costs	None Specified		X	
5.1	Student Service Administration	Semester Credits	None Specified	X		
5.2	Social & Cultural Development	Semester Credits	None Specified	X		
5.3	Counseling & Career Guidance	Semester Credits	None Specified	X		
5.4	Financial Aid Administration	Semester Credits	None Specified	X		
5.5	Student Auxiliary Services	Final Cost Objective*				
5.6	Intercollegiate Athletics	Final Cost Objective*				
6.1	Executive Management	Direct Costs	None Specified			X
6.2	Fiscal Operations	Direct Costs	None Specified			X
6.3	General Administrative Services	Direct Costs	None Specified			X
6.4	Logistical Services	Direct Costs	None Specified			X
6.5	Physical Plant Operations	Assignable Square Feet	Direct Costs			X
6.6	Faculty & Staff Auxiliary Services	Final Cost Objective*				
6.7	Public Relations & Development	Direct Costs	None Specified			X
6.8	Student Recruitment, Admissions & Records	Semester Credits	None Specified	X		
6.9	Central Office Operations	Direct Costs				X
7.1	Independent Operations/Institutional	Final Cost Objective				
7.2	Independent Operations/Outside Agencies	Final Cost Objective				
8.1	Scholarships	Final Cost Objective				
8.2	Fellowships	Final Cost Objective				
8.3	Provision for Doubtful Student Loans	Semester Credits	None Specified	X		
9.3	Rental Expenditures-Bldg. & Land Improvements	Assignable Square Feet	Direct Costs			X
9.4	Capital Cost-Building and Land Improvements	Assignable Square Feet	Direct Costs			X
9.5	Rental Expenditures-Equipment	Direct Costs	None Specified			X
9.6	Capital Cost-Equipment	Direct Costs	None Specified			X

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*Final Cost Objectives eligible to receive allocated costs are all subprograms within programs 1.0, 2.0 and 3.0, and subprograms 5.5, 5.6 and 6.6.

Indirect costs should be pooled at the lowest level of detail where costs can be associated with specific groups of users. For example, the costs of a business school library might be allocated only to the disciplines in the business school. If this were the case, then the costs of the business school library should be crossed over to 4.1.0500 (Business Library) during Step 3.4 rather than to the more general cost category 4.1, Libraries.

This same technique of crossing over data to a lower level of detail may also be used in adjusting for chargebacks in Step 2 of the implementation procedures. Chargebacks that have been reversed for direct cost purposes may be "restored" in the allocation process and only any uncharged balance in the supplying service center would be allocated using the allocation parameter. Examples would include chargebacks for rental of space and equipment, transportation services, and utilities.

Square Footage Data

Step 7 describes how indirect costs are allocated to final cost objectives for full cost analysis. These allocations may be done using either actual data or the IEP recommended allocation parameters. Most of the recommended allocation parameters are already developed as part of the direct cost analysis, such as total direct cost or IWLM units. However, the recommended allocation parameter for IEP activity centers 6.5, Physical Plant Operations; 9.3, Rental Expenditures--Building and Land Improvements; and 9.4, Capital Cost--Buildings and Land Improvements; is the assignable square feet associated with each of the recipient cost centers.[11]

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[11] Assignable square feet includes the sum of areas in all rooms that can be used by the building occupants to carry out their functions. Excluded are circulation, custodial, mechanical, and structural areas. A more detailed description of space assignment data is contained in Higher Education Facilities Inventory and Classification Manual (Romney, 1972).

Using this same technique to allocate the capital cost of buildings and land improvements and the capital cost of equipment to specific users may be particularly worthwhile and may assist in avoiding distorted full costs. If some buildings or equipment can be identified with specific activity centers, the capital cost for those items may be calculated separately, recorded at a lower level of detail, and then allocated only to the activity centers using the assets. The capital costs of a nuclear accelerator (and its separate building), for example, can be calculated separately, assigned to activity centers 9.4.1902 and 9.6.1902, and then allocated only to Physics Instruction and Physics Research in the allocation phase.

STEP 8--CALCULATE FULL UNIT COSTS

The eighth step in the cost study implementation is the calculation of full cost by unit of instruction for both disciplines and programs.

With one exception, full instructional discipline and student program unit costs are calculated in the same manner as direct unit costs. Calculations identical to those illustrated in Steps 4 and 5 are performed but in this step full discipline costs are used. (Full discipline costs are the direct costs shown in Figure 9 plus the total of all indirect costs allocated to each discipline as a result of Step 7.) Therefore, before full unit costs can be calculated, the costs of the president's office, the library, computing center, physical plant, and all the other support areas of the institution are allocated to the primary activities. Once all of these support costs are allocated, full unit costs of disciplines and student programs are calculated using the same steps applied in calculating direct unit costs.

STEP 9--ANALYZE COMPONENTS OF COST INFORMATION

Direct or full unit cost figures, in and of themselves, do not tell the analyst *why* one discipline is more expensive to teach than another. Unit costs should be viewed as indicators which can be used in a diagnostic manner similar to the way a doctor monitors a patient's health by checking temperature, pulse, and so forth. If any of these vital signs departs from a "normal" range, the doctor performs a more thorough examination of the patient to determine the cause.

Unit costs are a composite of many cost elements. To understand *why* unit costs differ, the analyst has to examine the cost components that make up the final cost figures. A set of potentially useful explanatory variables by department (or discipline) within course level includes:

- Faculty compensation unit costs per SCH produced
    - Percentage of faculty in each rank
    - Average length of service of faculty
    - Starting salary structure
    - Productivity ratio (SCH divided by faculty FTE)
      Average course credits taught per faculty FTE
      Average class size
- Nonfaculty unit costs (all direct unit costs except faculty compensation unit costs)
    - Administrative compensation per SCH

- Clerical (other) compensation per SCH
- Supplies, services, and equipment costs per SCH

The chain of reasoning that interrelates these variables is as follows (see Figure 13):

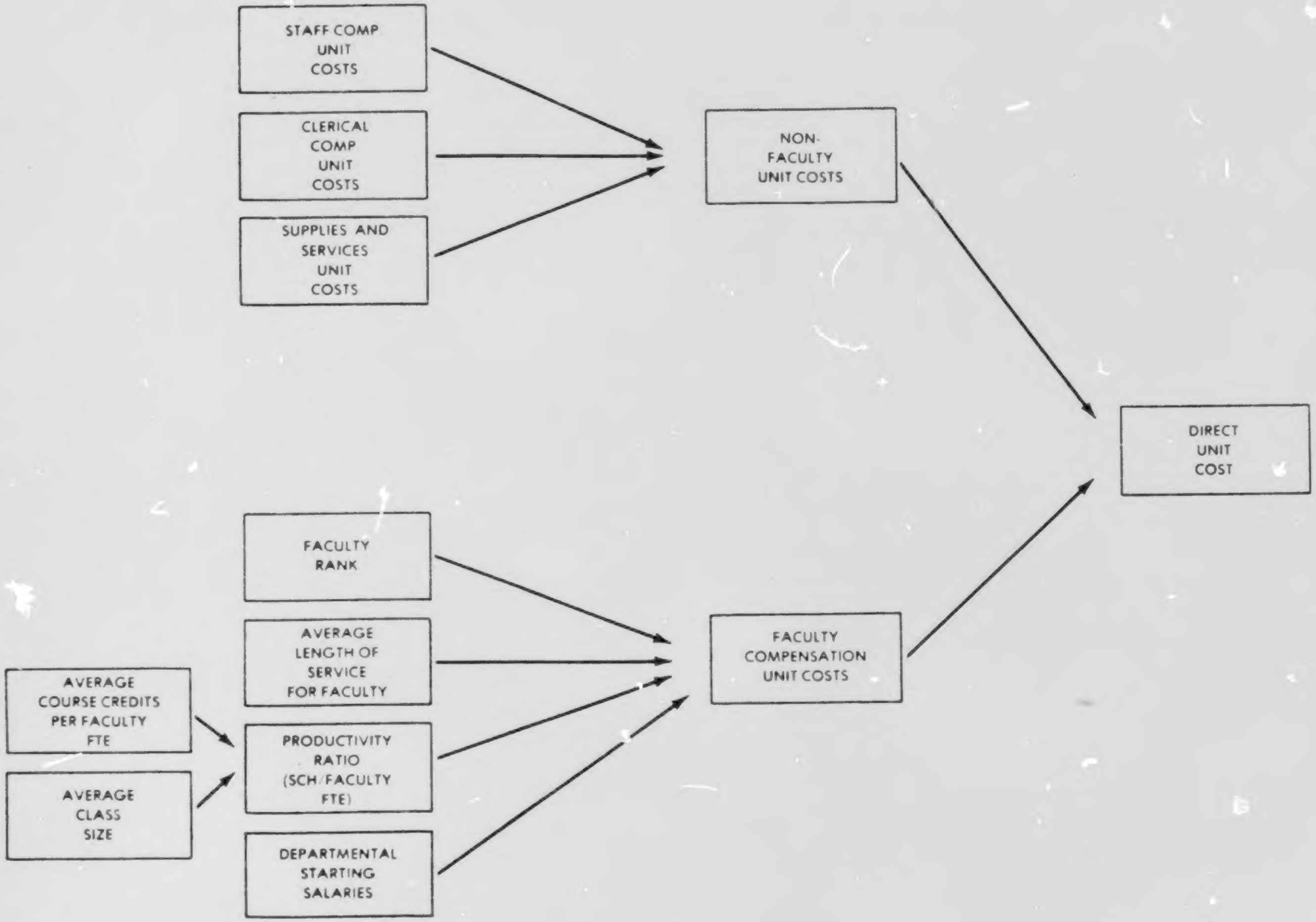
- Direct cost is made up of two major components: (1) faculty compensation and (2) all other departmental costs (supplies and services, administrative compensation, and clerical and other compensation). Both of these components can be converted to unit costs by dividing by credit hours produced.

- Therefore, a department that has high direct unit costs has: (1) high faculty compensation costs, (2) high other departmental costs, (3) low number of student credit hours produced, or (4) a combination of these three factors.

- If high faculty salaries per credit hour are the cause of high direct unit costs, there are several possible explanations: (1) faculty salary structures (within ranks) are different across departments, (2) high-cost departments have a large proportion of faculty at the full and associate professor ranks, (3) faculty members in the high-cost departments are producing fewer credit hours, and (4) certain departments have faculty who have been employed longer by the institution.

Figure 13

Components and Explanatory Factors For Direct Unit Costs Within Departments


STAFF COMP UNIT COSTS
CLERICAL COMP UNIT COSTS
SUPPLIES AND SERVICES UNIT COSTS
NON-FACULTY UNIT COSTS
DIRECT UNIT COST
FACULTY RANK
AVERAGE LENGTH OF SERVICE FOR FACULTY
AVERAGE COURSE CREDITS PER FACULTY FTE
PRODUCTIVITY RATIO (SCH/FACULTY FTE)
AVERAGE CLASS SIZE
DEPARTMENTAL STARTING SALARIES
FACULTY COMPENSATION UNIT COSTS

Source: Maureen Byers and Cathleen Bower, IEP Analysis and Use: Single-Institution Data. Technical Report 73, (NCHEMS: Boulder, Colorado, 1975).

- If a low productivity ratio appears to explain direct unit cost differences between or among two or more departments, a further breakdown of productivity ratio is possible. Average course credits per faculty FTE and average class size are the two components of the productivity ratio, although these are not computed directly as a part of IEP.

- If faculty compensation per credit hour appears similar among departments, then differences in nonfaculty unit costs must account for any direct unit cost differences. These other departmental costs can be investigated further by breaking them into three components: (1) administrative (staff) compensation per SCH, (2) clerical and other compensation per SCH, and (3) supplies and services costs per SCH.

Clearly this analysis will not lead directly to answers to such questions as why certain departments have larger proportions of full professors than others or why administrative compensation is different from one department to the next. Nor does it address questions of departmental efficiency or effectiveness. However, it does focus the administrator's attention on several key policy variables, namely, level of faculty compensation, relative faculty effort, faculty rank mix, average class size, student-faculty ratios, and so forth. By examining these key variables for each department and comparing them to predetermined norms or historical trend data, the administrator gains a better understanding of departmental cost differences.

SUMMARY

The nine steps described provide an overview of the Information Exchange Procedures cost study procedures and definitions. Throughout the description of the individual steps, reference has been made to performing a historical cost study for one of two purposes--either for internal management use of the data or for producing an exchangeable data set. This distinction is an important one. The activity structure, definitions, and procedures presented in this manual are specifically designed to give two or more users of the product exchangeable data. If comparative analysis is not the primary purpose of the user, then these standards can be relaxed. Figure 14, summarizing the IEP procedures and definitions, immediately follows the text. One column lists the general (or alternative) procedures and definitions that an institution may use in conducting its own cost study. This is followed by a second column that lists the recommended procedure for producing exchangeable data. Each item is referenced to a specific page number in the text where the particular procedure or definition is discussed more fully.

NACUBO and NCHEMS have made significant strides in the development and testing of historical costing procedures, but there still remain a number of unanswered questions in regard to the appropriate uses and limitations of the resulting information. NACUBO's original evaluation plan contained a section which intended to examine the utility of historical cost information at selected colleges and universities. The study would have focused on a sample of those institutions which had implemented the costing procedures contained in IEP. On-site visits would have been made to each campus to examine firsthand how historical cost information was being used in satisfying the institution's internal and external information needs. This work remains unfunded, but the two organizations consider this an important next step in the study of cost analysis in higher education.

The development of cost data recommended by the Procedures for Determining Historical Full Costs is not an insignificant task. However, with the help of a concise series of implementation steps and computer software support, this task becomes manageable. The availability of historical full cost information from both a single institution and from several similar institutions should provide benefits in the planning and management process that far outweigh the effort involved.

FIGURE 14

SUMMARY OF IEP COST STUDY PROCEDURES AND DEFINITIONS

Page Reference	Procedure or Definition	Institutional Cost Study for Internal Use	IEP Conventions for External Comparisons
2.5	Activity Structure	Organizational Units Unique to the Institution	IEP Activity Structure described in Technical Report #63; HEGIS taxonomy is used to identify academic disciplines and student programs.
2.6	Course Level	Definition Unique to the Institution	Lower Division .20 Upper Division .30 Graduate .50
2.8	Student Level	Definition Unique to the Institution	Lower Division .20 Upper Division .30 First Professional .40 Graduate I .50 Graduate II .60 Other--Specify .90
2.9	Types of Cost	Historical Cost Projected Cost Standard Cost Replacement Cost Imputed Cost	Historical Cost
2.9	Method of Accounting	Cash Basis Accrual Basis	Accrual Basis
2.10	Period of Analysis	Academic Year Fiscal Year Academic Term	Fiscal Year Including Special Sessions
2.11	Source of Funds	Classification Unique to the Institution	IEP does not attempt to categorize costs by source of funds.
2.14	Direct Cost	Those expenses that are readily identifiable with a cost objective.	Includes compensation (salaries, wages, and fringe benefits), supplies and services, travel and noncapital equipment.

FIGURE 14 (Continued)

SUMMARY OF IEP COST STUDY PROCEDURES AND DEFINITIONS

Page Reference	Procedure or Definition	Institutional Cost Study for Internal Use	IEP Conventions for External Comparisons
2.19	Pooled Expenses (Example: Fringe Benefits)	Treated as an indirect cost, if pooled in institutional accounting system.	Treated as direct cost if expenditure item is part of IEP definition for direct cost.
2.20	Central Office Expense (Example: Payroll Services)	Typically not included in an institutional cost study.	Should be included in an IEP cost study.
2.21	Reversal of Chargebacks (Example: Academic Computing Support)	Typically not necessary in an institutional cost study.	Reverse certain chargebacks in order to conform to IEP definition of direct cost.
2.21	Cost of Purchases for Resale (Example: Food Items in a Dormitory)	May or may not be excluded from an institutional cost study.	Should be excluded from IEP cost study. Assigned to 9.1 for reconciliation purposes.
2.22	Current Year's Capital Expenditures (Example: Capital Equipment)	May or may not be excluded from an institutional cost study.	Should be excluded from IEP cost study. Assigned to 9.2 for reconciliation purposes.
2.22	Rental and Lease Expenditures	May be treated as direct or indirect costs depending upon institutional policy.	Treated as indirect costs and assigned to activity center 9.3 and 9.5.
2.29	Distribution of Faculty Compensation	Faculty Activity Report Departmental Assessment of Faculty Workload Institutional Analysis of Faculty Assignments	IEP does not recommend a standard method for collecting faculty workload information. However, a set of recommended faculty activities to which costs should be assigned can be found on page 2.37.

FIGURE 14 (Continued)

SUMMARY OF IEP COST STUDY PROCEDURES AND DEFINITIONS

Page Reference	Procedure or Definition	Institutional Cost Study for Internal Use	IEP Conventions for External Comparisons
2.36	Distribution of Nonfaculty Compensation and Departmental Supplies and Services	Typically included as a direct cost of the academic department.	The majority of these expenditures are treated as a direct cost of the academic "home" department.
2.39	Costing Unit	FTE Student Semester Credit Student Contact Hour Student Major Degree Awarded Course Enrollment	Semester Credit or its Equivalent.
2.43	Capital Costs	Typically not included in an institutional cost study.	Includes a depreciation or use charge for buildings, land improvements, and capital equipment. Also includes provision for actual interest incurred on capital acquisitions.
2.47	Allocation of Indirect Costs	Set of Allocation Procedures Unique to the Institution.	The IEP recommended set of allocation procedures can be found on page 2.49. Institutions may substitute a procedure that better reflects resource utilization.

CHAPTER 3

COSTING AND DATA MANAGEMENT SYSTEM

COSTING AND DATA MANAGEMENT SYSTEM

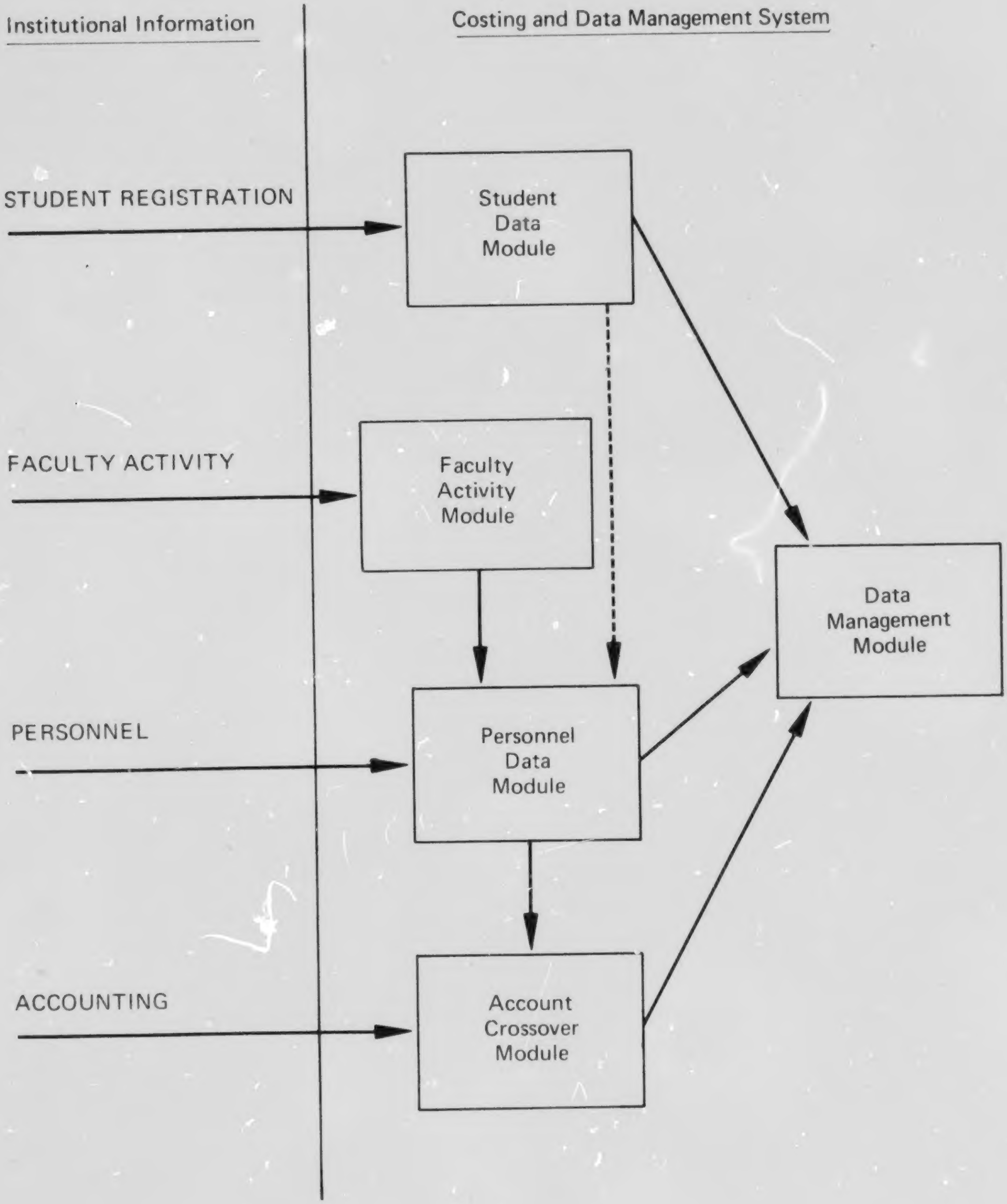
As described in the introduction to this manual, the NCHEMS Costing and Data Management System (CADMS) is a computer software tool to assist an institution in conducting a cost study using the Information Exchange Procedures. This section of the manual describes how various modules of CADMS assist in the cost study.

Figure 15 indicates the CADMS modules used in the cost study and the flow of information between these modules. Use of the Student Data Module, the Personnel Data Module, the Account Crossover Module, and the Data Management Module is described in this section of this manual. The Faculty Activity Module is used in conjunction with the NCHEMS Faculty Activity Analysis survey instrument to provide more detailed information concerning faculty effort and the distribution of faculty compensation in the cost study. Because most institutions do not use a faculty activity analysis in their cost studies, the use of the Faculty Activity Module is not included in this manual.

This manual describes only the basic features of each CADMS module that are used to conduct the cost study. Each module has a number of additional options and extensions that facilitate performing more detailed or sophisticated analyses. The reader is encouraged to examine the reference manuals for CADMS to become acquainted with these additional features.

Figure 15

Modules of the NCHEMS Costing and Data Management System Used in the IEP Cost Study



Institutional Information
Costing and Data Management System
STUDENT REGISTRATION
FACULTY ACTIVITY
PERSONNEL
ACCOUNTING
Student Data Module
Faculty Activity Module
Personnel Data Module
Account Crossover Module
Data Management Module

STUDENT DATA MODULE

STUDENT DATA MODULE (SDM)

OVERVIEW

The Student Data Module (SDM) facilitates:

1. DEVELOPMENT of an Instructional Work Load Matrix, and
2. TRANSFER of student data to the Data Management Module (DMM).

It also provides a series of reports displaying these student-related data in a number of different aggregations. Two types of data are produced. First, the SDM provides student enrollment data describing the number of full-time equivalent, headcount, full-time, and part-time students in the institution. Second, and more important, it produces an Instructional Work Load Matrix (IWLM), one of the basic requirements for the NCHEMS Information Exchange Procedures cost study. This matrix allows the computation of direct and full unit costs for disciplines and student programs. Like all the other Costing and Data Management System software, SDM produces other types of data and has additional capabilities, such as producing an Induced Course Load Matrix (ICLM) for use by the Resource Requirements Prediction Model 1.6 (RRPM 1.6).

As previously discussed, an IWLM identifies the relationship between disciplines and student programs. This relationship can be viewed two ways. First, the IWLM displays the credit hour totals that each discipline (by course level) contributes to each student program (by student level). This is referred to as the Contribution Report. Second, it displays the credit hour totals that each student program (by student level) "consumes" or draws from each discipline (by course level). This is referred to as the Consumption Report. The description of IEP implementation Step 2 on page 2.12 further describes the concept of an IWLM.

The development of an IWLM is computationally straightforward. It involves summing the credit hours that students in each student program take from each discipline. For example, Figure 16 illustrates the data necessary to build an IWLM. Note where the credit hours Sue Kay earns in Lower Division Biology are added in the matrix. Following this process for each student registration record will result in a matrix similar to that illustrated in Figure 16.

Note that the IWLM "DISCIPLINE" is a translation of the course prefix and number into a description of the appropriate "ROW" (discipline and course level) in the matrix. For example, Sue Kay's enrollment in BIO-104 is translated into Lower Division Biology (the course number 104 is in the 000-299 range representing lower division courses.) This is used to identify the IWLM discipline.

The IWLM "PROGRAM" is a translation of "major" and "student level" into a definition of the appropriate "COLUMN" (program and student level) in the matrix. Sue Kay's data, for example, are translated from "BIOC" major and "LD" student level into Lower Division Biochemistry. This is used to identify the IWLM major (student program).

Figure 16
Development of an IWLM

SELECTED STUDENT REGISTRATION RECORDS

STUDENT ID	STUDENT NAME	COURSE PREFIX	NO.	MAJOR	STUDENT LEVEL	SEMESTER CREDITS	IWLM DISCIPLINE	IWLM PROGRAM
723-31-8133	Sue Kay	BIO	104	BIOC	LD	3	L.D. BIOLOGY	BIOCHEM-L.D.
720-33-8122	Robert Allen	BIO	112	PSYC	LD	3	L.D. BIOLOGY	PSYCH-L.D.
649-29-7111	Mary Smith	ENG	210	ENGL	UD	3	L.D. ENGLISH	ENGLISH-U.D.
743-31-7981	Arnold Black	MATH	256	ENGL	UD	3	L.D. MATH	ENGLISH-U.D.
711-34-6122	Michael Lee	CHEM	100	BIOC	LD	5	L.D. CHEM	BIOCHEM-L.D.
731-36-8644	Robert Trent	BIO	104	PSYC	LD	3	L.D. BIOLOGY	PSYCH-L.D.

NOTE: Lower division courses carry numbers from 0 through 299
Upper division courses carry numbers from 300 through 499

INSTRUCTIONAL WORK LOAD MATRIX

DISCIPLINES BY INSTRUCTIONAL LEVEL	DEGREE PROGRAMS BY STUDENT LEVEL					
	Biochemistry Lower Div.	Biochemistry Upper Div.	English Lower Div.	English Upper Div.	Psychology Lower Div.	Psychology Upper Div.
L.D. Biology	3				6	
U.D. Biology		Sue Kay's course				
L.D. English				3		
U.D. English						
L.D. Math				3		
U.D. Math						
L.D. Chemistry	5					
U.D. Chemistry		Michael Lee's Course				

DATA REQUIREMENTS TO DEVELOP AN IWLM

The data required to create an IWLM can be located in the student/course-related files typically found in either the computer center or the registrar's office. The seven data elements typically used to create an IWLM are:

> STUDENT IDENTIFIER--This element is needed when calculating the total headcount enrollment of an institution. This element is not required for producing an IWLM.
>
> DISCIPLINE--This element is usually coded as the locally assigned course prefix. The column in Figure 16 labeled Course Prefix exemplifies these typical codes, such as 'BIO', which represents the Biology discipline.
>
> COURSE LEVEL--This element depicts the academic level of the instructional course offering. Typically, the locally assigned course number will provide this information. For example, in Figure 16, course numbers from 000 through 299 represent lower division instruction and course numbers 300 through 499 represent upper division instruction.
>
> STUDENT PROGRAM--This element indicates the major field of study of a student. In Figure 16, Sue Kay is majoring in Biochemistry, which is represented by the code 'BIOC'.
>
> STUDENT LEVEL--This element indicates the academic level of the student, which is typically based on the number of credits completed (freshman, sophomore, junior, senior, and so forth). Figure 16 illustrates the student level with the codes LD (lower division) and UD (upper division).
>
> CREDIT UNITS--This element depicts the credit hours received by the student for the course. As illustrated in Figure 16, the semester credits contained within these sample student registration records range from three to five units.
>
> ACTIVITY--This element is usually coded to indicate the term in which the course was taken. Term identifiers are not shown for the data in Figure 16.

So that the IWLM is representative of all student course patterns, the basic input is a record containing the above information for each student enrolled in each course during the full year covered by the cost study. In the NCHEMS IEP cost study procedures, it is recommended that the student registration data be collected at the institutionally defined census date (following the drop/add time period) for all academic terms during the fiscal year.

CONVERSION OF STUDENT REGISTRATION DATA TO THE IEP ACTIVITY STRUCTURE

To eliminate the necessity of incorporating the IEP costing structure into an institution's data files or writing new computer software to convert data to these codes, the Student Data Module will convert institutional student-related codes to the IEP activity structure. Five of the seven SDM data elements and comments on their proper conversion are illustrated in Figure 17 and described below.

> DISCIPLINE CODE--Figure 17 shows the institutional codes found on the sample student registration record (in Figure 16) and to which four-digit codes they must be converted.[12] These IEP activity codes have been taken from the HEGIS taxonomy.[12]
>
> STUDENT PROGRAM--Like the discipline codes, the student program codes are translated to the HEGIS taxonomy.[12]
>
> COURSE LEVEL--The course numbers in this example represent course levels. Therefore, using the IEP activity structure definition, the lower division courses are tagged with the code '.20', upper division with '.30', and graduate with '.50'.[12]
>
> STUDENT LEVEL--Student levels are shown in this example as LD and UD for lower and upper division students, respectively. According to the Information Exchange Procedures, these codes should be converted to '.20' and '.30', respectively.[12]
>
> ACTIVITY--Although the term in which a course is taken is usually entered for the activity, this value should be converted to the IEP subprogram '1.1.' (for General Academic Instruction). (Disciplines properly included in other instructional areas--such as Occupational and Vocational instruction--may be recoded later in the analysis or more detailed SDM reports, which provide data for each term, may be produced later. For the first analysis, however, it is recommended that all activity codes be converted to '1.1.' for IEP purposes.)

---

[12] The codes are found in Information Exchange Procedures Activity Structure, Technical Report 63.

Figure 17
Conversion of Student Registration Data

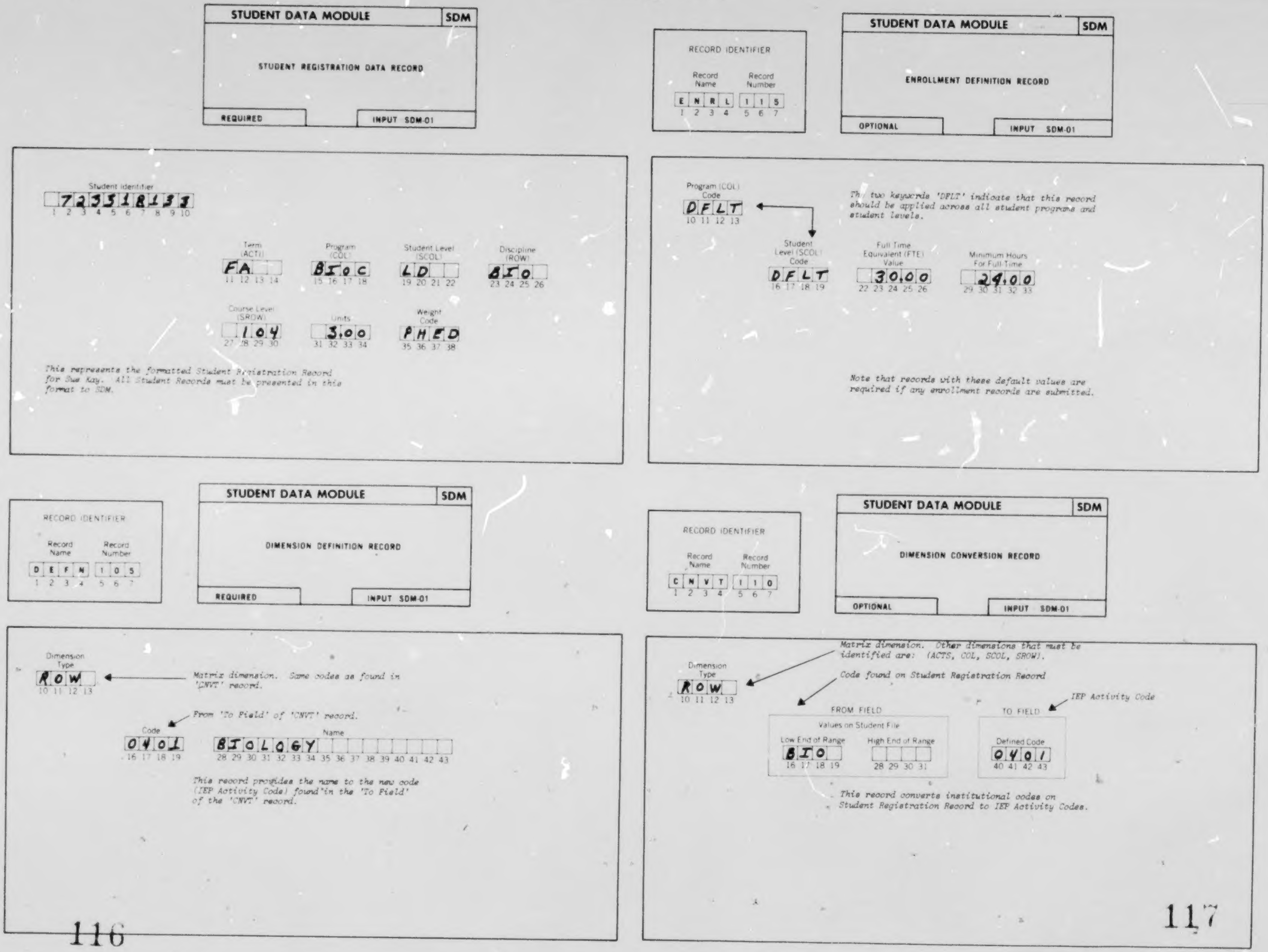
	FROM		TO	
	Institution Codes	Institution Names	IEP Activity Codes	IEP Activity Names
Disciplines (ROW)	BIO	BIOLOGY	0401	BIOLOGY
	ENG	ENGLISH	1501	ENGLISH
	MATH	MATH	1701	MATH
	CHEM	CHEMISTRY	1905	CHEMISTRY
Student Programs (COL)	BIOC	BIOCHEMISTRY	0414	BIOCHEMISTRY
	PSYC	PSYCHOLOGY	2001	PSYCHOLOGY
	ENGL	ENGLISH	1501	ENGLISH
Course Levels (SROW)	000-299	LOWER DIVISION	.20	LOWER DIVISION
	300-499	UPPER DIVISION	.30	UPPER DIVISION
Student Levels (SCOL)	LD	LOWER DIVISION	.20	LOWER DIVISION
	UD	UPPER DIVISION	.30	UPPER DIVISION
Activity (ACTI)	FA	FALL	1.1.	INSTRUCTION
	SP	SPRING	1.1.	INSTRUCTION

Samples of the data and input forms required to process data through the Student Data Module are illustrated in Figure 18. Four records are used in this process. A brief description of each of these records is provided below:

> STUDENT REGISTRATION DATA RECORD--Contains the data for each course enrollment for the time period being analyzed.
>
> DIMENSION DEFINITION RECORD (DEFN)--This record supplies a name for each unique IEP code which is used for reports. The particular dimension (such as Activity or Discipline) being defined is specified by the Dimension Type field. Dimension Type codes of ROW, SROW, COL, SCOL and ACTI are used for discipline, course level, student program, student level, and activity, respectively. In Figure 18 the IEP activity center discipline 0401-Biology is being defined.
>
> DIMENSION CONVERSION RECORD (CNVT)--This record actually converts the institutional codes to the IEP activity codes. Figure 18 indicates that the institutional discipline code of 'BIO' is to be converted to the IEP activity center discipline '0401.'
>
> ENROLLMENT DEFINITION RECORD (ENRL)--This record provides SDM with definitions of a full-time equivalent (FTE) student and a full-time (FT) student. If this optional feature is used, definitions must be provided for each student program and each student level. The ENRL record shown in Figure 18 illustrates how to provide a single enrollment definition to apply to all student programs and levels. The value '30' represents the credit hour definition of an FTE student during a fiscal year and the value '24' represents the minimum credit hours required for a student to be considered a full-time student. If certain programs or student levels have different definitions, these values can be provided to SDM as exceptions to these "overriding" values.

Figure 19 lists the five steps required to process data through the Student Data Module. The use of these steps and the required input forms are illustrated in Figure 20 for all of the data shown in Figures 16 and 17.

Figure 10
SDM Coding Forms



STUDENT DATA MODULE SDM

STUDENT REGISTRATION DATA RECORD

REQUIRED
INPUT SDM-01

Student Identifier: 723518133 (1 2 3 4 5 6 7 8 9 10)

Term (ACTI): FA (11 12 13 14)
Program (COL): BIOC (15 16 17 18)
Student Level (SCOL): LD (19 20 21 22)
Discipline (ROW): BIO (23 24 25 26)
Course Level (SROW): 104 (27 28 29 30)
Units: 3.00 (31 32 33 34)
Weight Code: PHED (35 36 37 38)

This represents the formatted Student Registration Record for Sue Kay. All Student Records must be presented in this format to SDM.

RECORD IDENTIFIER
Record Name: DEFN (1 2 3 4)
Record Number: 105 (5 6 7)

STUDENT DATA MODULE SDM

DIMENSION DEFINITION RECORD

REQUIRED
INPUT SDM-01

Dimension Type: ROW (10 11 12 13)

Matrix dimension. Same codes as found in 'CNVT' record.

From 'To Field' of 'CNVT' record.

Code: 0401 (16 17 18 19)
Name: BIOLOGY (28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43)

This record provides the name to the new code (IEP Activity Code) found in the 'To Field' of the 'CNVT' record.

RECORD IDENTIFIER
Record Name: ENRL (1 2 3 4)
Record Number: 115 (5 6 7)

STUDENT DATA MODULE SDM

ENROLLMENT DEFINITION RECORD

OPTIONAL
INPUT SDM-01

Program (COL) Code: DFLT (10 11 12 13)

The two keywords 'DFLT' indicate that this record should be applied across all student programs and student levels.

Student Level (SCOL) Code: DFLT (16 17 18 19)
Full Time Equivalent (FTE) Value: 30.00 (22 23 24 25 26)
Minimum Hours For Full-Time: 24.00 (29 30 31 32 33)

Note that records with these default values are required if any enrollment records are submitted.

RECORD IDENTIFIER
Record Name: CNVT (1 2 3 4)
Record Number: 110 (5 6 7)

STUDENT DATA MODULE SDM

DIMENSION CONVERSION RECORD

OPTIONAL
INPUT SDM-01

Matrix dimension. Other dimensions that must be identified are: (ACTS, COL, SCOL, SROW).

Dimension Type: ROW (10 11 12 13)

Code found on Student Registration Record

IEP Activity Code

FROM FIELD
Values on Student File
Low End of Range: BIO (16 17 18 19)
High End of Range: (28 29 30 31)

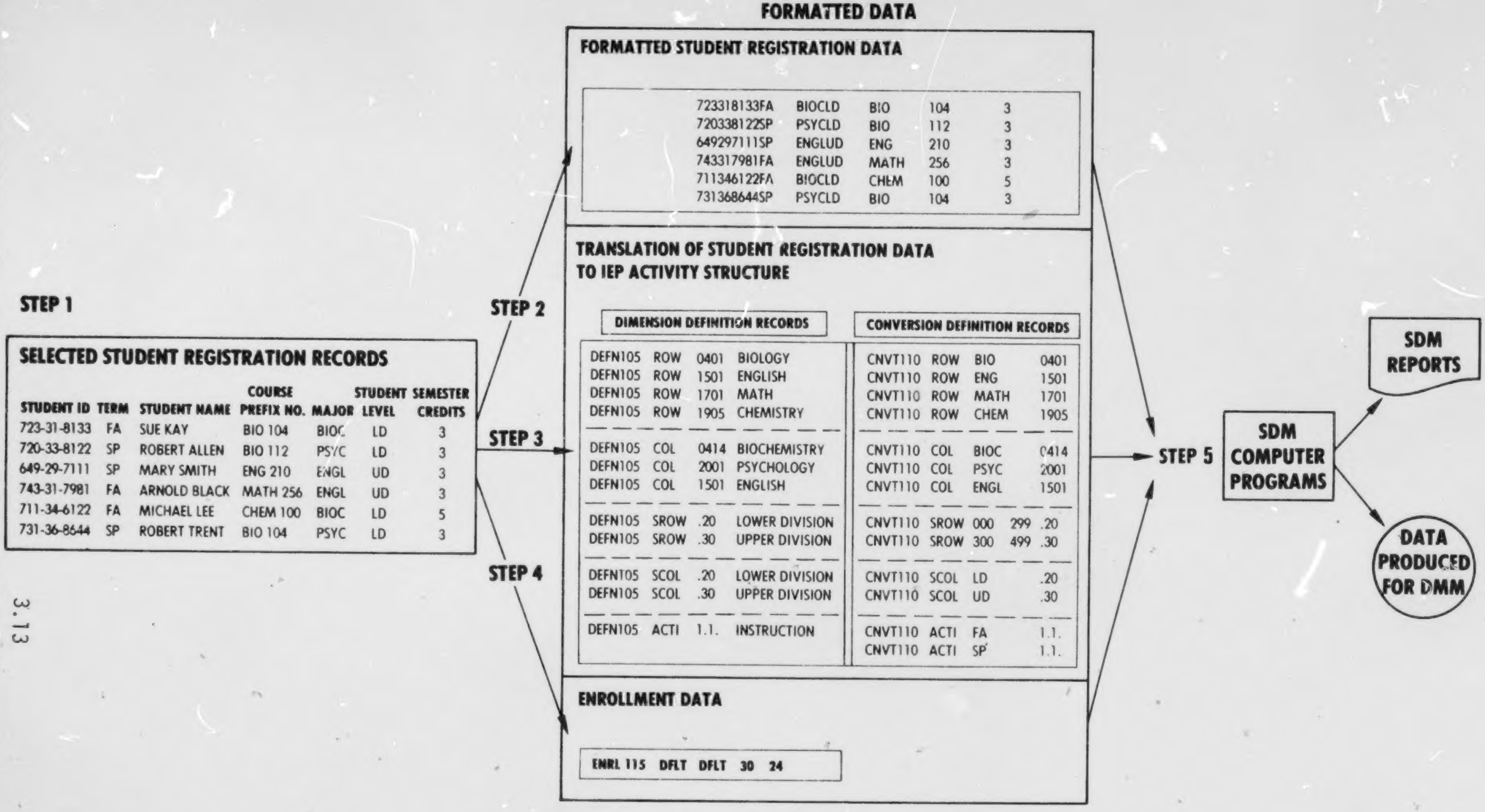
TO FIELD
Defined Code: 0401 (40 41 42 43)

This record converts institutional codes on Student Registration Record to IEP Activity Codes.

Figure 19
Preparation of Student Data

Steps 1 and 2	Identify source of student registration data and code in required SDM format
Step 3	Convert student registration data into IEP activity structure • Student program using HEGIS taxonomy • Disciplines using HEGIS taxonomy • Student levels using assigned IEP codes • Course levels using assigned IEP codes • Activity (to 1.1.)
Step 4	Provide student enrollment definitions for: • Full-Time Equivalent (FTE) student • Full-Time (FT) student
Step 5	Process student registration data conversion table and enrollment data using SDM to produce the IWLM required by the data management module.

Figure 20
Data Required for SDM



SELECTED STUDENT REGISTRATION RECORDS

STUDENT ID	TERM	STUDENT NAME	COURSE PREFIX NO.	MAJOR	STUDENT LEVEL	SEMESTER CREDITS
723-31-8133	FA	SUE KAY	BIO 104	BIOC	LD	3
720-33-8122	SP	ROBERT ALLEN	BIO 112	PSYC	LD	3
649-29-7111	SP	MARY SMITH	ENG 210	ENGL	UD	3
743-31-7981	FA	ARNOLD BLACK	MATH 256	ENGL	UD	3
711-34-6122	FA	MICHAEL LEE	CHEM 100	BIOC	LD	5
731-36-8644	SP	ROBERT TRENT	BIO 104	PSYC	LD	3

FORMATTED STUDENT REGISTRATION DATA

723318133FA	BIOCLD	BIO	104	3
720338122SP	PSYCLD	BIO	112	3
649297111SP	ENGLUD	ENG	210	3
743317981FA	ENGLUD	MATH	256	3
711346122FA	BIOCLD	CHEM	100	5
731368644SP	PSYCLD	BIO	104	3

TRANSLATION OF STUDENT REGISTRATION DATA TO IEP ACTIVITY STRUCTURE

DIMENSION DEFINITION RECORDS

DEFN105	ROW	0401	BIOLOGY
DEFN105	ROW	1501	ENGLISH
DEFN105	ROW	1701	MATH
DEFN105	ROW	1905	CHEMISTRY
DEFN105	COL	0414	BIOCHEMISTRY
DEFN105	COL	2001	PSYCHOLOGY
DEFN105	COL	1501	ENGLISH
DEFN105	SROW	.20	LOWER DIVISION
DEFN105	SROW	.30	UPPER DIVISION
DEFN105	SCOL	.20	LOWER DIVISION
DEFN105	SCOL	.30	UPPER DIVISION
DEFN105	ACTI	1.1.	INSTRUCTION

CONVERSION DEFINITION RECORDS

CNVT110	ROW	BIO		0401
CNVT110	ROW	ENG		1501
CNVT110	ROW	MATH		1701
CNVT110	ROW	CHEM		1905
CNVT110	COL	BIOC		0414
CNVT110	COL	PSYC		2001
CNVT110	COL	ENGL		1501
CNVT110	SROW	000	299	.20
CNVT110	SROW	300	499	.30
CNVT110	SCOL	LD		.20
CNVT110	SCOL	UD		.30
CNVT110	ACTI	FA		1.1.
CNVT110	ACTI	SP		1.1.

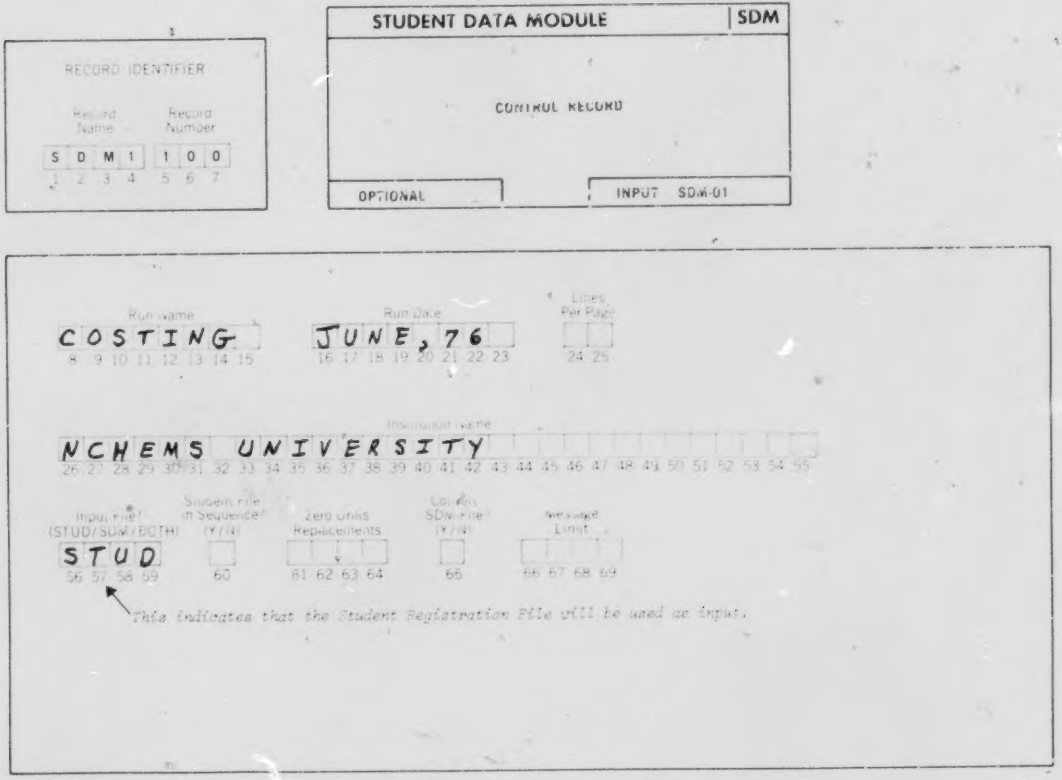
ENROLLMENT DATA

ENRL 115 DFLT DFLT 30 24

SDM CONTROL RECORDS

Figures 21 through 23 illustrate the control records required to run SDM. The most commonly used control fields are shown on these control records and other records illustrated in this manual. For more detailed information on the use of each input field, refer to the Student Data Module Reference Manual, Technical Report 60. Figure 21 shows the control card required by the first of the three SDM programs (SDM01). Figure 22 shows the control and data request records required by the third program (SDM03) to produce the Contribution Report, IWLM data, and enrollment data in a format for input to the Data Management Module. Figure 23 shows the Control Record required by the third program (SDM03) to produce the Consumption Report.

Figure 21
SDM1 Control Record


STUDENT DATA MODULE
SDM
CONTROL RECORD
OPTIONAL
INPUT SDM-01
RECORD IDENTIFIER
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15
16 17 18 19 20 21 22 23
24 25
26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55
56 57 58 59
60
61 62 63 64
65
66 67 68 69

Record Name: SDM1
Record Number: 100
Run Name: COSTING
Run Date: JUNE, 76
Lines Per Page:
Institution Name: NCHEMS UNIVERSITY
Input File? (STUD/SDM/BOTH): STUD
Student File in Sequence? (Y/N):
Zero Units Replacements:
Current SDM File? (Y/N):
Message Limit:

This indicates that the Student Registration File will be used as input.

Figure 22

Control and Request Records for Displaying the Contribution Report and Producing Data for DMM

RECORD IDENTIFIER

Record Name: S D M 3 (1 2 3 4)
Record Number: 1 3 5 (5 6 7)

STUDENT DATA MODULE **SDM**

CONTROL RECORD

OPTIONAL

INPUT SDM-03

Run Name (8–15): COSTING
Run Date (16–23): JUNE, 76
Lines Per Page (24–25):
SDM File Sequence? (ROW/COL) (26–28): ROW
Which Activity (ACT) Wanted? (29–32):
Print Option (33): 1
Program Center Identifier (CID) Prefix (34–37):
Which Enrollment? (FTE/HEAD) (38–41):
DMM Function? (C/U/E/R) (42):
Heading Option? (Y/N) (43):

This requests the contribution (DISCIPLINE) report.

RECORD IDENTIFIER

Record Name: D M M E (1 2 3 4)
Record Number: 1 4 5 (5 6 7)

STUDENT DATA MODULE **SDM**

DATA REQUEST RECORD (EITHER SEQUENCE)

OPTIONAL

INPUT SDM-03

ENROLLMENT UPDATES

Head Count? (Y/N) (8): Y
Head Count Parameter Identifier (PID) (9–20): ENROLL.HEAD
Full Time? (Y/N) (21): Y
Full Time Parameter Identifier (PID) (22–33): ENROLL.FULL
Part Time? (Y/N) (34): Y
Part Time Parameter Identifier (PID) (35–46): ENROLL.PART
FTE? (Y/N) (47): Y
FTE Parameter Identifier (PID) (48–59): ENROLL.FTE
Discipline IWLM Updates? (Y/N) (60): Y
IWLM PID Prefix (61–64):
Program IWLM Updates? (Y/N) (65):
IWLM PID Prefix (66–69):
RRPM "ENRL" Records? (Y/N) (70):

This record allows the user to create various types of updates for the Data Management Module. (The Discipline IWLM updates are necessary for the Data Management Module to calculate program costs.)

RECORD IDENTIFIER

Record Name: D M M R (1 2 3 4)
Record Number: 1 4 0 (5 6 7)

STUDENT DATA MODULE **SDM**

DATA REQUEST RECORD (ROW SEQUENCE)

OPTIONAL

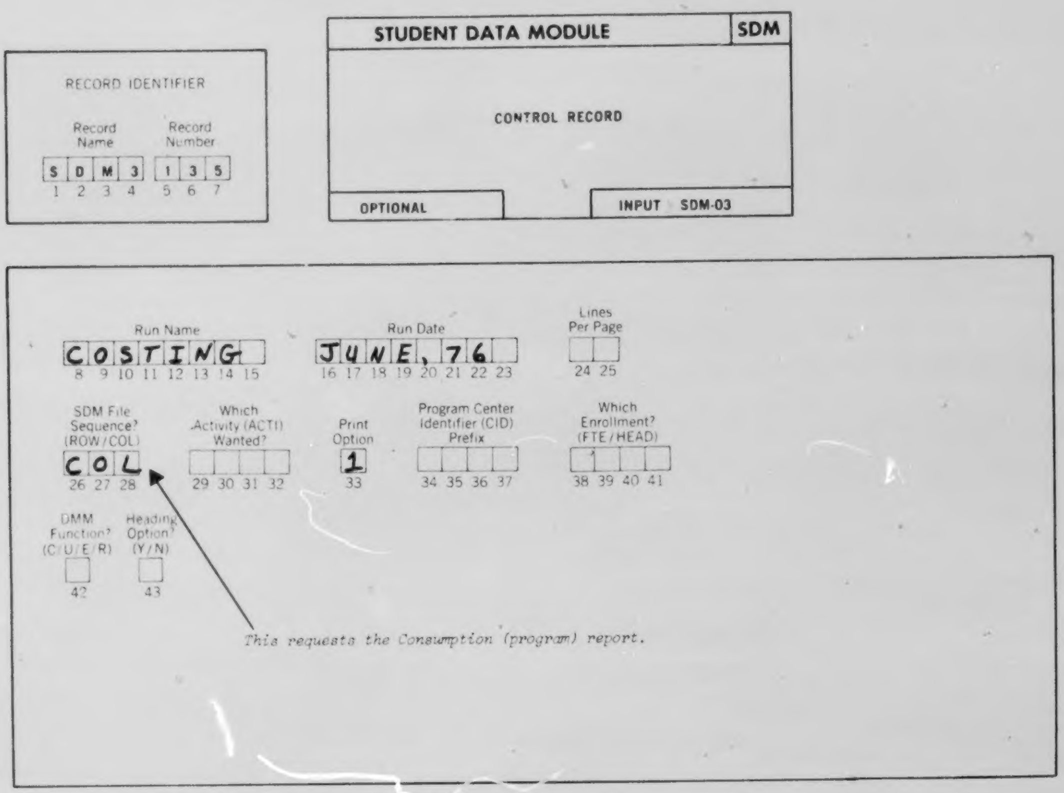
INPUT SDM 03

Discipline Credit Hour Updates? (Y/N) (8): Y
Parameter Identifier (PID) (9–20): CREDIT.HOURS
RRPM "DISC" Records? (Y/N) (21):

This record allows the user to create update records containing discipline credit hours for use with the Personnel Data Module and/or the Data Management Module. (These updates are required by the Data Management Module in order to compute discipline unit costs. The updates are not required by the Personnel Data Module.)

Figure 23

Control Record for Producing the SDM Consumption Report



RECORD IDENTIFIER

Record Name: S D M 3 (1 2 3 4)

Record Number: 1 3 5 (5 6 7)

STUDENT DATA MODULE | **SDM**

CONTROL RECORD

OPTIONAL

INPUT SDM-03

Run Name: COSTING (8 9 10 11 12 13 14 15)

Run Date: JUNE,76 (16 17 18 19 20 21 22 23)

Lines Per Page: (24 25)

SDM File Sequence? (ROW/COL): COL (26 27 28)

Which Activity (ACTI) Wanted?: (29 30 31 32)

Print Option: 1 (33)

Program Center Identifier (CID) Prefix: (34 35 36 37)

Which Enrollment? (FTE/HEAD): (38 39 40 41)

DMM Function? (C/U/E/R): (42)

Heading Option? (Y/N): (43)

This requests the Consumption (program) report.

ADDITIONAL SDM TOPICS

Two SDM features provide substantial additional flexibility with calculations using the UNITS field on the Student Registration Record. Proper planning for the use of these features can avoid wasted effort throughout the analysis. These features and the input records required to use them are described below.

Zero Units Replacement

Some institutions have certain courses that may be required but for which students do not receive any course credit. Examples of these courses are freshmen seminars, physical education, and military science courses or courses offered during a special term, such as an interim term for schools that are on a "4-1-4" calendar system. However, resources are expended in providing these courses and, if no credit value is attributed to them, the unit cost of recorded credit hours in the related disciplines will be artificially high. Most institutions therefore decide that some arbitrary credit value should be assigned to these courses. As shown in Figure 21, the Control Record for SDM program one permits specifying a "Zero Units Replacement" value. This numeric value will be used as the UNITS field on all Student Registration Records that have a zero value (or a blank) Units field.

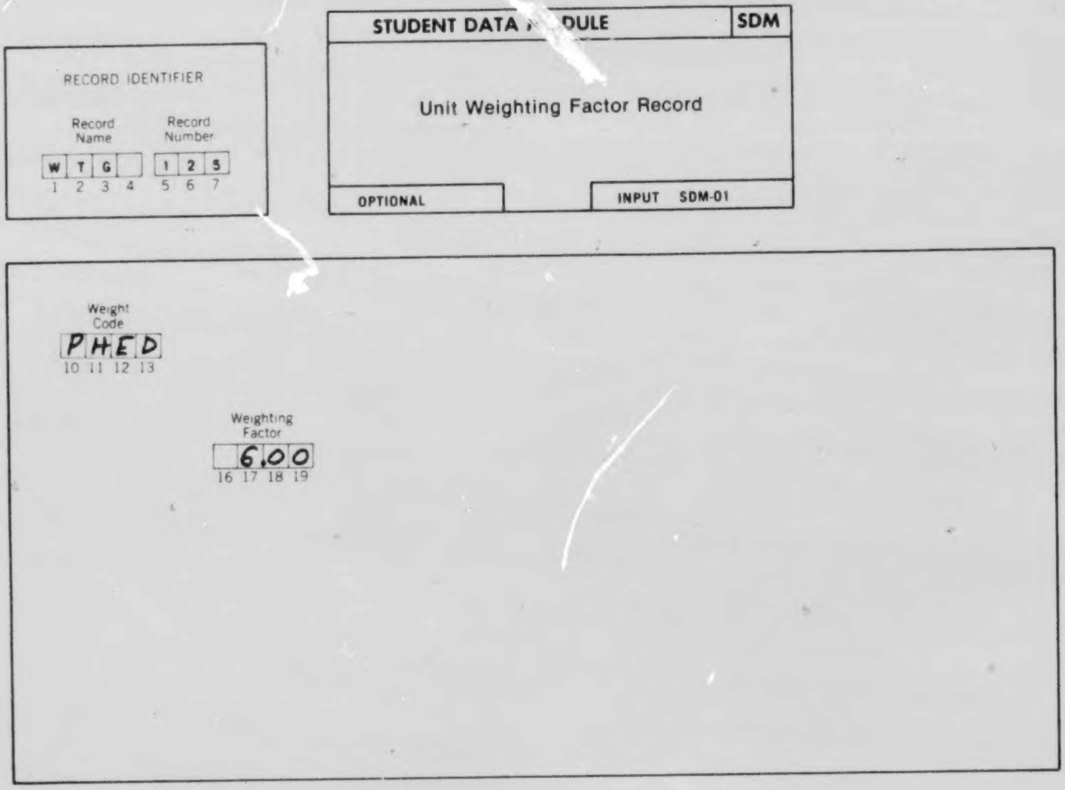
Analytical accuracy and flexibility can be achieved through use of this feature by including Student Registration Records for all of these "zero credit" courses and then using this Control Record to assign a credit value when SDM is run. (Assigning this value when SDM is run--rather than including it in the Student Registration Record itself--permits easily changing the arbitrary value if institutional data users believe the original value selected was inappropriate.)

Unit Weighting

Similar to the zero credit courses described above, many institutions have courses whose credit value seems to be assigned on a basis different from most of the institutional courses. Examples of these are music, physical education, and teacher training. Credit received for these courses is often one-half or one unit whereas most courses provide three, four, or five units. To cause the unit cost data for these courses to be calculated on a similar basis as other institutional courses, a weighting factor may be applied to the unit's value on the Student Registration Record. Figure 24 illustrates the record on which these weighting factors may be provided.

Note the Weight Code field on this record and on the Student Registration Record shown in Figure 24. In this example, all Student Registration Records that have a weight code of 'PHED' will have their unit value multiplied by 6.00. One-half unit courses will therefore become three units, and so forth. Multiple Unit Weighting Factor Records may be applied to employ different weighting factors.

Figure 24
Unit Weighting Factor Record



STUDENT DATA MODULE
SDM
Unit Weighting Factor Record
OPTIONAL
INPUT SDM-01

RECORD IDENTIFIER
Record Name: W T G (1 2 3 4)
Record Number: 1 2 5 (5 6 7)

Weight Code: PHED (10 11 12 13)
Weighting Factor: 6.00 (16 17 18 19)

EXAMPLE OF SDM DATA

Figure 25 provides an example of most of the data required by SDM to produce and display IWLM reports and to create formatted data to be passed to the Data Management Module. These data were derived from the data displayed in Figure 17 (with an additional discipline and student program, which are used in the examples in this manual).

SDM REPORTS

Each of the Costing and Data Management System modules produces a number of reports. Some of these reports simply describe the data that have been supplied to the module and errors found in those data. Other reports summarize the results of the processing done by the module. This manual illustrates this latter type of report. For a more complete description of all reports produced by the system, see NCHEMS Costing and Data Management System--Sample Reports, Technical Report 56.

The two principal reports produced by the Student Data Module are the Contribution and the Consumption Reports, illustrated in Figures 26 and 27, respectively. The Contribution Report shows the credit hours generated by each discipline and course level and the student programs to which the credit hours were contributed. The Consumption Report shows the credit hours "consumed" by each student program and student level and the disciplines from which the credit hours were taken.

Figure 25
Sample SDM Input

```
00000000011111111112222222222333333333344444444445555555555666666666677777777778
12345678901234567890123456789012345678901234567890123456789012345678901234567890

SDM1100COSTING JUNE.76   N C H E M S  U                      STUD
DEFN105  ROW   0401          BIOLOGY
DEFN105  ROW   1501          ENGLISH
DEFN105  ROW   1701          MATH
DEFN105  ROW   1905          CHEMISTRY
DEFN105  ROW   4999          ALL OTHER
DEFN105  COL   0414          BIOCHEMISTRY
DEFN105  COL   2001          PSYCHOLOGY
DEFN105  COL   1501          ENGLISH
DEFN105  COL   4999          ALL OTHER
DEFN105  SCOL  .30           UPPER DIVISION
DEFN105  SCOL  .20           LOWER DIVISION
DEFN105  SROW  .20           LOWER DIVISION
DEFN105  SROW  .30           UPPER DIVISION
DEFN105  ACTI  1.1.          INSTRUCTION
CNVT110  ROW   BIO                          0401
CNVT110  ROW   ENG                          1501
CNVT110  ROW   MATH                         1701
CNVT110  ROW   CHEM                         1905
CNVT110  ROW   ELSE                         4999
CNVT110  COL   BIOC                         0414
CNVT110  COL   PSYC                         2001
CNVT110  COL   FNGL                         1501
CNVT110  COL   ELSE                         4999
CNVT110  SROW   000           299           .20
CNVT110  SROW   300           499           .30
CNVT110  SCOL  LD                           .20
CNVT110  SCOL  UD                           .30
CNVT110  ACTI  FA                           1.1.
CNVT110  ACTI  SP                           1.1.
FNRL115  DFLT  DFLT   3600   2400
```

These records are:

1. *Control record for SDM1.*
2. *"DEFN" and "CNVT" records for the student registration data shown below.*
3. *ENRL record defining an FTE and a full-time student.*

```
SDM3135COSTING JUN.76    ROW    0
DMMR140YCREDIT.HOURS
DMME145YENROLL.HEAD YENROLL.FULL YENROLL.PART YENROLL.FTE  Y    N    N

SDM3135COSTING JUN.76    COL    0
```

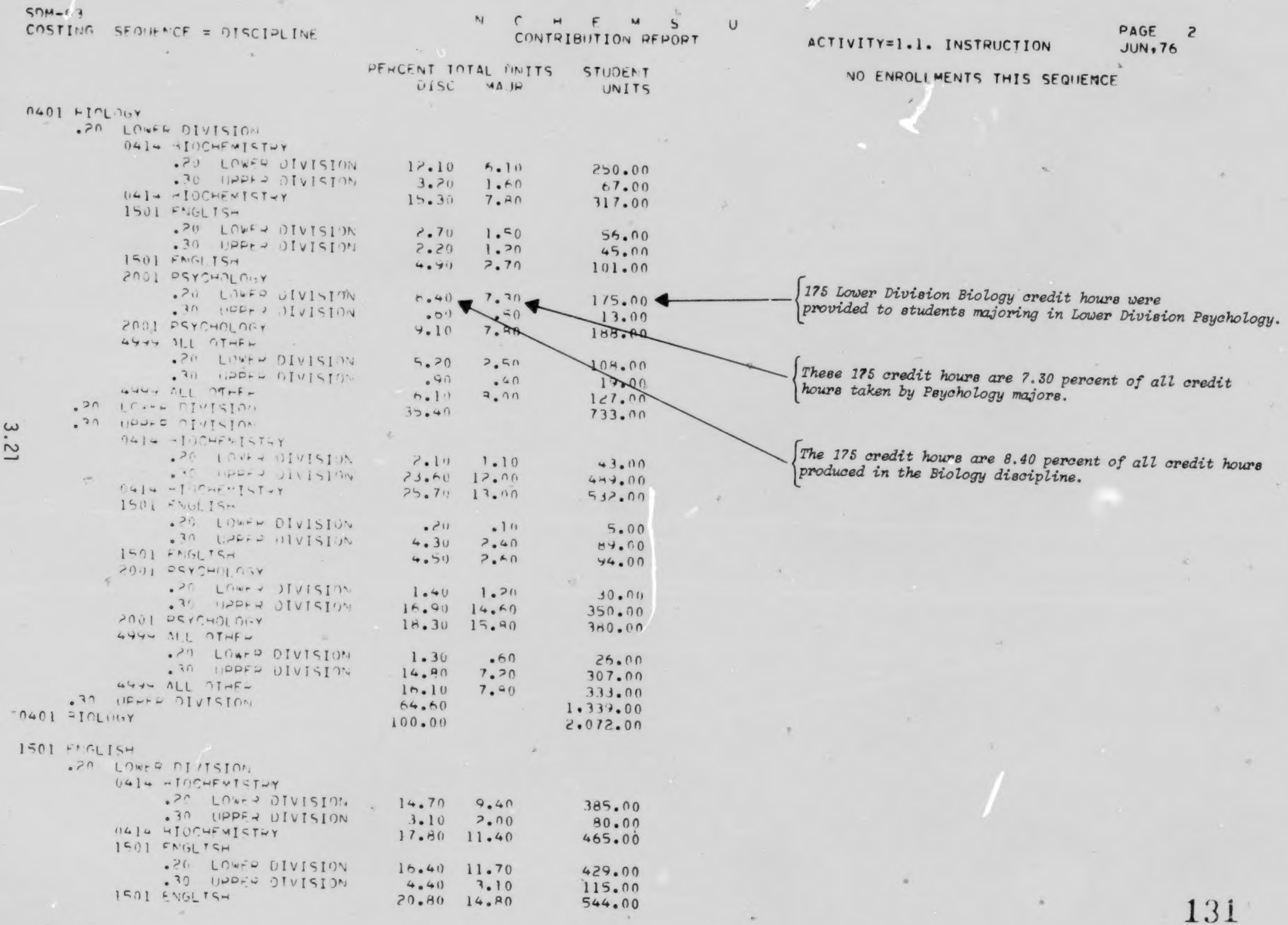
The Control Cards and request data for producing consumption and contribution reports and DMM data.

```
 723318133FA  BIOCLD  BIO  104 300
 720338122SP  PSYCLD  BIO  112 300
 649297111SP  ENGLUD  ENG  210 300
 743317981FA  ENGLUD  MATH 256 300
 711346122FA  CHFMLD  CHEM 100 300
 731368644SP  PSYCLD  BIO  104 300

00000000011111111112222222222333333333344444444445555555555666666666677777777778
               7890123456789012345678901234567890123456789012345678901234567890
```

The formatted student registration data.

SDM Contribution Report



```
SDM-03
COSTING  SEQUENCE = DISCIPLINE                      N   C   H   E   M   S   U
                                                    CONTRIBUTION REPORT           ACTIVITY=1.1. INSTRUCTION        PAGE   2
                                                                                                                   JUN,76
                                          PERCENT TOTAL UNITS   STUDENT
                                            DISC    MAJR         UNITS              NO ENROLLMENTS THIS SEQUENCE

0401 BIOLOGY
     .20  LOWER DIVISION
          0414 BIOCHEMISTRY
               .20  LOWER DIVISION         12.10    6.10        250.00
               .30  UPPER DIVISION          3.20    1.60         67.00
          0414 BIOCHEMISTRY                15.30    7.80        317.00
          1501 ENGLISH
               .20  LOWER DIVISION          2.70    1.50         56.00
               .30  UPPER DIVISION          2.20    1.20         45.00
          1501 ENGLISH                      4.90    2.70        101.00
          2001 PSYCHOLOGY
               .20  LOWER DIVISION          8.40    7.30        175.00
               .30  UPPER DIVISION           .60     .50         13.00
          2001 PSYCHOLOGY                   9.10    7.80        188.00
          4999 ALL OTHER
               .20  LOWER DIVISION          5.20    2.50        108.00
               .30  UPPER DIVISION           .90     .40         19.00
          4999 ALL OTHER                    6.10    3.00        127.00
     .20  LOWER DIVISION                   35.40                733.00
     .30  UPPER DIVISION
          0414 BIOCHEMISTRY
               .20  LOWER DIVISION          2.10    1.10         43.00
               .30  UPPER DIVISION         23.60   12.00        489.00
          0414 BIOCHEMISTRY                25.70   13.00        532.00
          1501 ENGLISH
               .20  LOWER DIVISION           .20     .10          5.00
               .30  UPPER DIVISION          4.30    2.40         89.00
          1501 ENGLISH                      4.50    2.60         94.00
          2001 PSYCHOLOGY
               .20  LOWER DIVISION          1.40    1.20         30.00
               .30  UPPER DIVISION         16.90   14.60        350.00
          2001 PSYCHOLOGY                  18.30   15.80        380.00
          4999 ALL OTHER
               .20  LOWER DIVISION          1.30     .60         26.00
               .30  UPPER DIVISION         14.80    7.20        307.00
          4999 ALL OTHER                   16.10    7.90        333.00
     .30  UPPER DIVISION                   64.60              1,339.00
*0401 BIOLOGY                             100.00              2,072.00

1501 ENGLISH
     .20  LOWER DIVISION
          0414 BIOCHEMISTRY
               .20  LOWER DIVISION         14.70    9.40        385.00
               .30  UPPER DIVISION          3.10    2.00         80.00
          0414 BIOCHEMISTRY                17.80   11.40        465.00
          1501 ENGLISH
               .20  LOWER DIVISION         16.40   11.70        429.00
               .30  UPPER DIVISION          4.40    3.10        115.00
          1501 ENGLISH                     20.80   14.80        544.00
```

175 Lower Division Biology credit hours were provided to students majoring in Lower Division Psychology.

These 175 credit hours are 7.30 percent of all credit hours taken by Psychology majors.

The 175 credit hours are 8.40 percent of all credit hours produced in the Biology discipline.

Figure 27
SDM Consumption Report

```
SDM-03                                          N  C  H  E  M  S     U                                         PAGE    2
COSTING   SEQUENCE = STUDENT MAJOR              CONSUMPTION REPORT            ACTIVITY=1.1. INSTRUCTION       JUN,76

                                       PERCENT TOTAL UNITS   STUDENT     UNITS PER        ...... E N R O L L M E N T S .......
                                         MAJR    DISC         UNITS       F.T.E.         F.T.E. HEADCOUNT FULL-TIME PART-TIME

0414 BIOCHEMISTRY
     .20  LOWER DIVISION
          0401 BIOLOGY
                .20  LOWER DIVISION      6.10   12.10        250.00        4.38
                .30  UPPER DIVISION      1.10    2.10         43.00         .75
          0401 BIOLOGY                   7.20   14.10        293.00        5.13
          1501 ENGLISH
                .20  LOWER DIVISION      9.40   14.70        385.00        6.74
                .30  UPPER DIVISION      1.10    1.60         43.00         .75
          1501 ENGLISH                  10.50   16.40        428.00        7.50
          1701 MATH
                .20  LOWER DIVISION      7.80   13.70        319.00        5.59
                .30  UPPER DIVISION       .40     .60         15.00         .26
          1701 MATH                      8.20   14.40        334.00        5.85
          1905 CHEMISTRY
                .20  LOWER DIVISION      8.60   17.30        350.00        6.13
                .30  UPPER DIVISION       .70    1.30         27.00         .47
          1905 CHEMISTRY                 9.20   18.70        377.00        6.60
          4999 ALL OTHER
                .20  LOWER DIVISION     11.10    8.40        453.00        7.94
                .30  UPPER DIVISION      4.20    3.10        170.00        2.98
          4999 ALL OTHER                15.30   11.50        623.00       10.91
     .20  LOWER DIVISION                50.40               2.055.00       36.00           57.08
     .30  UPPER DIVISION
          0401 BIOLOGY
                .20  LOWER DIVISION      1.60    3.20         67.00        1.19
                .30  UPPER DIVISION     12.00   23.60        489.00        8.71
          0401 BIOLOGY                  13.60   26.80        556.00        9.90
          1501 ENGLISH
                .20  LOWER DIVISION      2.00    3.10         80.00        1.42
                .30  UPPER DIVISION       .20     .40         10.00         .18
          1501 ENGLISH                   2.20    3.40         90.00        1.60
          1701 MATH
                .20  LOWER DIVISION      1.40    2.50         59.00        1.05
                .30  UPPER DIVISION      3.60    6.30        146.00        2.60
          1701 MATH                      5.00    8.90        205.00        3.65
          1905 CHEMISTRY
                .20  LOWER DIVISION      1.10    2.10         43.00         .77
                .30  UPPER DIVISION     11.00   22.30        450.00        8.01
          1905 CHEMISTRY                12.10   24.40        493.00        8.78
          4999 ALL OTHER
                .20  LOWER DIVISION      2.00    1.50         81.00        1.44
                .30  UPPER DIVISION     14.60   11.00        597.00       10.63
          4999 ALL OTHER                16.60   12.50        678.00       12.07
     .30  UPPER DIVISION                49.60               2.022.00       36.00           56.17
0414 BIOCHEMISTRY                      100.00               4.077.00       36.00          113.25

1501 ENGLISH
     .20  LOWER DIVISION
```

Students majoring in Lower Division Biochemistry took 385 credit hours in Lower Division English.

These 385 credit hours are 14.70 percent of all credit hours offered in English.

The 385 credit hours are also 9.40 percent of all credit hours taken by students majoring in Biochemistry.

3.22

PERSONNEL DATA MODULE

PERSONNEL DATA MODULE (PDM)

OVERVIEW

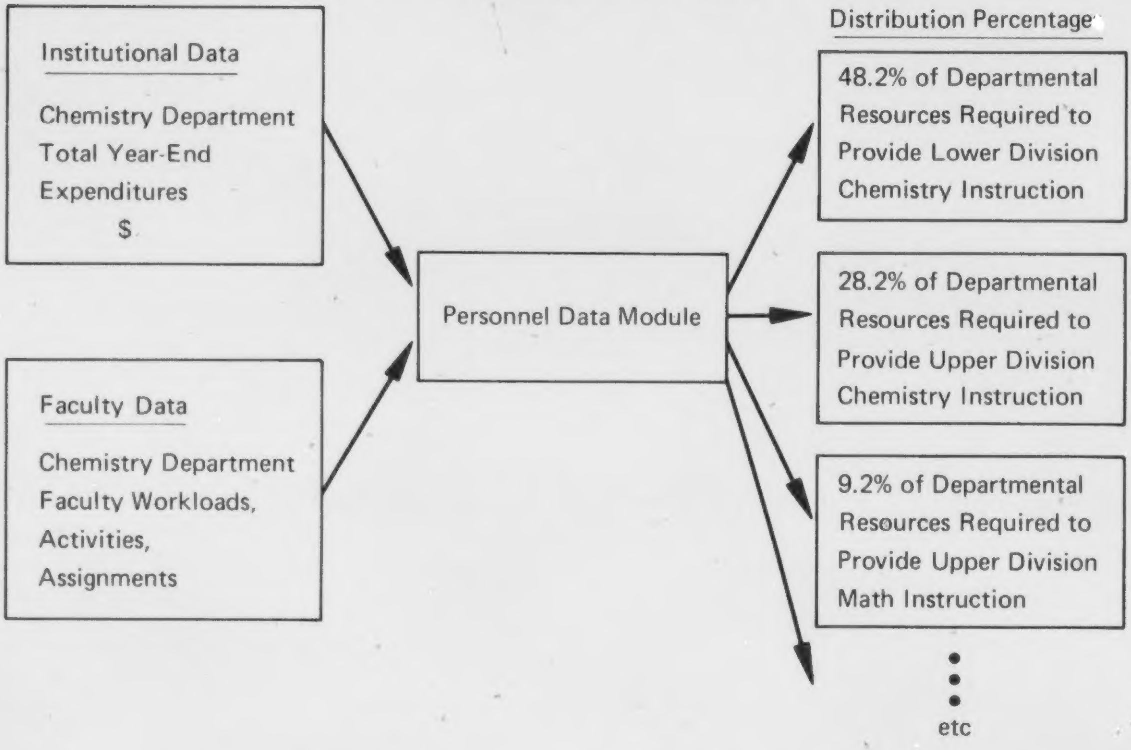
It is common for expenditures represented by a single institutional financial or budgetary account to support a number of different activities, such as research, public service, and instruction, across more than one discipline at multiple course levels. The Personnel Data Module (PDM) provides a method for analyzing activities that the account supports. The measure of personnel activities (for example, hours worked, courses taught, weekly contact hours) serves as the basis for distributing the expenditures and personnel effort related to the account.

For IEP, the Personnel Data Module is helpful primarily in determining the pattern for distributing instructional account expenditures to the HEGIS disciplines and course levels. *It is used in completing Step 3.3 in the Information Exchange Procedures implementation.* (PDM will distribute any institutional account, but because noninstructional accounts such as library, audiovisual, and business office often relate to a single IEP activity center, they can typically be crossed over to the appropriate center using a less complex method.)

After analyzing faculty activities supported by various institutional accounts, PDM determines distribution percentages that indicate how each account should be crossed over to the IEP activity structure. An overview of this analysis is shown in Figure 28. PDM does *not* perform this

Figure 28
Personnel Data Module
Overview

Chemistry Department Analysis


Institutional Data
Chemistry Department Total Year-End Expenditures
$
Faculty Data
Chemistry Department Faculty Workloads, Activities, Assignments
Personnel Data Module
Distribution Percentage
48.2% of Departmental Resources Required to Provide Lower Division Chemistry Instruction
28.2% of Departmental Resources Required to Provide Upper Division Chemistry Instruction
9.2% of Departmental Resources Required to Provide Upper Division Math Instruction
etc

account crossover itself but passes these distribution percentages to the Account Crossover Module, where the actual "crossing over" of the account expenditures is performed.

Figure 29 shows in more detail the analysis performed by PDM in developing distribution percentages for an account. As illustrated, the Chemistry Department expended a total of $51,450, of which $40,650 was expended for faculty compensation. Institutional data Ⓐ identifies the faculty members paid from the account, their compensation, activities, and percentage of time associated with each activity. These institutional data might be collected through a faculty activity analysis survey instrument. In that case, the proportion of time would be represented in hours per week and would be converted by PDM to percentages. In most

Figure 29

Crossover of Chemistry Department Expenditures(1)

Ⓐ

PERSON/ IDENTIFIER	FUND DATA		TASK DATA	
	ACCOUNT	COMPENSATION	ACTIVITY	PROPORTION
M. JONES	18-520	$18,150	LD CHEMISTRY INSTRUCTION	66.6%
			UD CHEMISTRY INSTRUCTION	16.6
Ⓑ			DEPARTMENT CHAIRPERSON	16.6
				100%
J. WILSON	18-520	$22,500	LD CHEMISTRY INSTRUCTION	33.3%
			UD CHEMISTRY INSTRUCTION	37.5
			UD MATH INSTRUCTION	16.7
			CHEMISTRY RESEARCH	12.5
				100%

INSTRUCTION			CHEMISTRY CHAIRPERSON 4.6.1905	CHEMISTRY RESEARCH 2.1.1905
LD CHEMISTRY 1.1.1905.20	UD CHEMISTRY 1.1.1905.30	UD MATH 1.1.1701.30		
$12,100				
	$3,025			
			$3,025	
7,500				
	8,438			
	Ⓒ	$3,750		
				$2,812

CHEMISTRY DEPARTMENT EXPENDITURES		
18-520	SALARIES	$40,650
18-523	SECRETARIAL	8,000
18-525	STUDENT HELP	1,000
18-581	TRAVEL	800
18-584	SUPPLIES	1,000
TOTAL		$51,450

TOTALS

							NOTES
CONTRIBUTION TOTALS	$40,650	$19,600	$11,463	$3,750	$3,025	$2,812	(2)
DISTRIBUTION PERCENTAGES	100%	48.2%	28.2%	9.2%	7.5%	6.9%	(2)
CROSSOVER AMOUNTS	$51,450	$24,799	$14,508	$4,733	$3,860	$3,550	(3)

NOTES

(1) Some totals may not add because of rounding

(2) Dollar amounts are used in PDM to compute crossover percentages. Percentages are passed to ACM

(3) Crossover is actually performed in Account Crossover Module

institutions, however, the data would come from some institutional record-based system that maintains faculty instructional assignments and any formal assignment for nonteaching activities, such as coaching intercollegiate athletics, student counseling, and research. In this case the proportion of time can often be best represented by faculty contact hours. PDM will convert this representation of faculty time to percentages, as shown in Figure 29.

The proportion of a faculty member's time related to each activity is the basis for distributing compensation to activities. In the example in Figure 29, faculty member M. Jones, Ⓑ, devoted 66 percent of her time to instruction in the Chemistry discipline at the lower division course level. Accordingly, 66 percent of her compensation is contributed to the column describing that activity. In the same manner, the remainder of her compensation is distributed across her activities. The same computation is done for all other faculty members funded by the same account.

Each column is then summed, Ⓒ , to produce the total contribution (CONTRIBUTION TOTALS) to each activity by all faculty members. The "DISTRIBUTION PERCENTAGES" then represent contribution totals as a percentage of the total amount. For example, the 48.2 percent for Lower Division Chemistry instruction is calculated by dividing the $19,600 contribution total for Lower Division Chemistry by the $40,650 contribution total for the entire Chemistry Department salary account.

(As described earlier, these distribution percentages are passed to the Account Crossover Module where the actual crossover is performed. The

IEP procedures recommend that instructional direct expenses other than compensation be crossed over in the same manner as the related compensation accounts. In conformance with this procedure, the entire $51,450--rather than just the $40,650 compensation--is shown as being crossed over in Figure 29.)

PDM DATA REQUIREMENTS

The data necessary to develop distribution percentages for instructional compensation accounts may be found in institutional personnel, payroll, and/or faculty record systems. Recognizing that there might be multiple sources for personnel data, PDM expects combinations of three separate record types for each person to be included in the analysis. PDM data required for each faculty member for the IEP cost study are:

- Faculty Identifier (a unique number)
- Faculty Name (for reporting purposes only)
- Funding Account Number (general ledger account identifier)
- Compensation (salary and fringe benefits)
- Faculty Assignments/Activities
    - Type of activity (task)
    - Proportion of time spent in each activity (for example, hours per week or contact hours)

Figure 30 contains sample faculty data that will be used in describing the three basic PDM input coding forms.

Figure 30
Sample Faculty Activity Data

Faculty Identifier	Faculty Name	Service-Months	Institutional Account Number	Faculty Rank	Compensation	Activity	Contact Hours
263-78-7804	Mary Jones	10	18-520	Professor	$18,150	Instruction Chem 106	3
						Instruction Chem 107	3
						Instruction Chem 106	3
						Instruction Chem 250	3
						Instruction Chem 428	3
						Department Chairperson	3
						TOTAL	
481-01-1501	John Wilson	10	18-520	Assistant Professor	$22,500	Instruction Chem 276	5
						Instruction Chem 290	3
						Instruction Chem 499	4
						Instruction Chem 499	5
						Instruction Math 401	4
						Research Chem	3
						TOTAL	24

NOTE: Lower Division courses carry numbers from 0 through 299.
Upper Division courses carry numbers from 300 through 499.

Person Identifier Record

Each faculty member analyzed by PDM must be described by a Person Identifier Record. This record contains the following fields:

PERSON IDENTIFIER--A unique identifier for the person. Other PDM records for the person must have the same identifier.

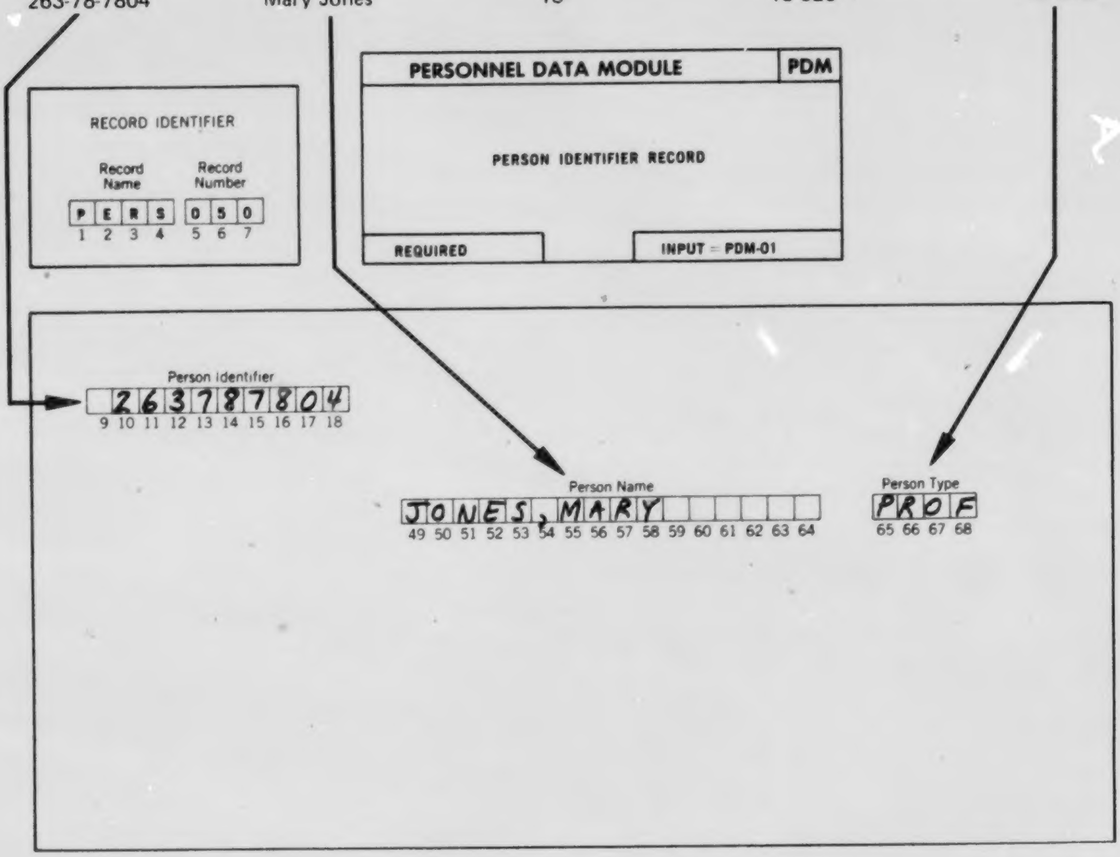
PERSON NAME--The faculty member's name may be included for reports generated by the system.

PERSON TYPE--The optional field helps qualify or further classify the person. This field may be used, for example, to represent faculty rank to allow analysis by rank and the generation of RRPM 1.6 data by faculty rank. Including person type will not affect the computation of distribution percentages for IEP.

Figure 31 illustrates the use of the Person Identifier Record to code data for faculty member Mary Jones.

Figure 31
Person Identifier Record

Faculty Identifier	Faculty Name	Service Months	Institutional Account Number	Faculty Rank
263-78-7804	Mary Jones	10	18-520	Professor


RECORD IDENTIFIER
Record Name
Record Number
P E R S
0 5 0
1 2 3 4
5 6 7
PERSONNEL DATA MODULE
PDM
PERSON IDENTIFIER RECORD
REQUIRED
INPUT = PDM-01
Person Identifier
2 6 3 7 8 7 8 0 4
9 10 11 12 13 14 15 16 17 18
Person Name
J O N E S , M A R Y
49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64
Person Type
P R O F
65 66 67 68

Funding Account Record

Each faculty member also should have a Funding Account Record for each institutional account from which he or she is paid. Data elements included on this record are:

PERSON IDENTIFIER--Same as on Person Identifier Record

PERSON QUALIFIER--This qualifier code is used to restrict the expenditures of a funding account to specific activities or tasks. A further explanation is given in the Restricted Funds description on page 3.43.

PERSON UNITS--This field should indicate the number of service-months associated with the compensation from this account.

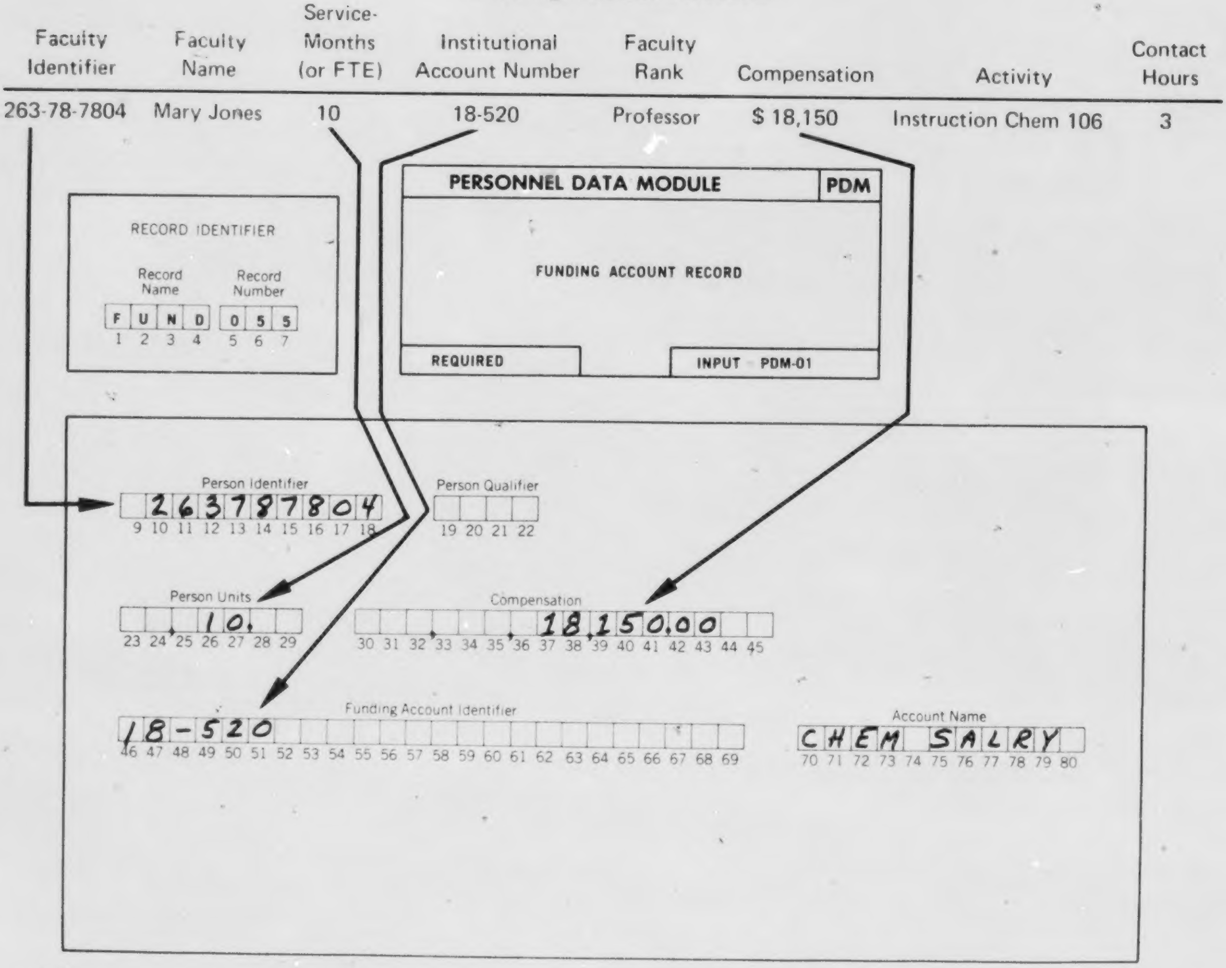
PERSON COMPENSATION-- The compensation (salary and fringe benefits) received from the financial account specified in the Funding Account Identifier field. Salary is acceptable if fringe benefits cannot easily be obtained for each faculty member.

FUNDING ACCOUNT IDENTIFIER--The complete general ledger account number, including object or transaction codes from which the person is paid. (The account number and its placement in this field must be identical to the coding of the account number in the Account Crossover Module.)

ACCOUNT NAME--Optional field containing the account name for reporting purposes.

Figure 32 illustrates the Funding Account Record for Mary Jones.

Figure 32
Funding Account Record



Faculty Identifier	Faculty Name	Service-Months (or FTE)	Institutional Account Number	Faculty Rank	Compensation	Activity	Contact Hours
263-78-7804	Mary Jones	10	18-520	Professor	$ 18,150	Instruction Chem 106	3

RECORD IDENTIFIER
Record Name: FUND
Record Number: 055

PERSONNEL DATA MODULE — PDM
FUNDING ACCOUNT RECORD
REQUIRED
INPUT PDM-01

Person Identifier: 263787804
Person Qualifier:
Person Units: 10.
Compensation: 18150.00
Funding Account Identifier: 18-520
Account Name: CHEM SALRY

1 2 3 4
5 6 7
9 10 11 12 13 14 15 16 17 18
19 20 21 22
23 24 25 26 27 28 29
30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45
46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69
70 71 72 73 74 75 76 77 78 79 80

Person Task Record

Each activity or assignment that the faculty member is engaged in should be identified using a Person Task Record. The data elements for this record include:

PERSON IDENTIFIER--Same as on Person Identifier Record.

PERSON QUALIFIER--This qualifier code is used to restrict the expenditures of a funding account to specific activities or tasks. A further explanation is given in the Restricted Funds description on page 3.43.

ACTIVITY UNITS--The number of units, for example, hours per week or contact hours, associated with this activity. The unit of measure for all activities related to an individual faculty member *must* be consistent.

ACTIVITY--This field should contain some descriptive indicator that can be crossed over to a subprogram within the IEP activity center. "INST" might be used for instruction, "RESH" for research, "ADMN" for administrative activities, and so forth. Because most institutions do not have predefined institutional codes for these different types of activities, it may be just as easy to enter directly the IEP subprogram code (1.1., 2.1., 4.6., etc.) in this field.

DISC/DEPT--This identifies the department or discipline code for instructional activities, program category for research and academic support activities, and is not required for other activities.

COURSE LEVEL--This field should be used *only for instructional activities.* It should contain a course level code or a course number where ranges of course numbers can be converted to a unique course level.

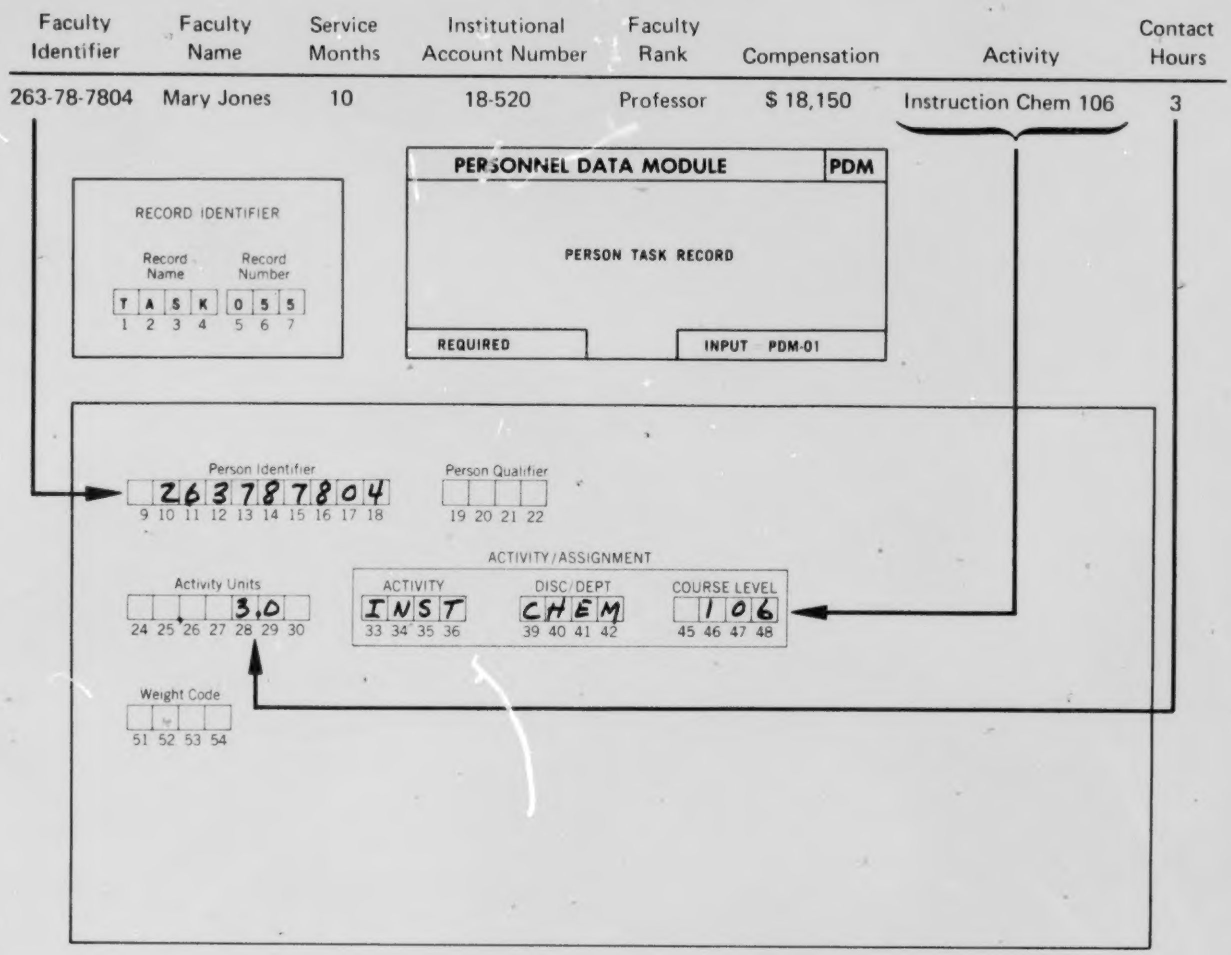
WEIGHT CODE--See description under Additional PDM Topics section (page 3.43).

Figure 33 illustrates the coding of a Person Task Record for one of the courses taught by Mary Jones.

PDM Record Summary

Each individual analyzed by PDM must have one (and only one) Person Identifier Record, at least one Funding Account Record, and at least one Person Task Record.

Figure 33
Person Task Record



Faculty Identifier	Faculty Name	Service Months	Institutional Account Number	Faculty Rank	Compensation	Activity	Contact Hours
263-78-7804	Mary Jones	10	18-520	Professor	$ 18,150	Instruction Chem 106	3

PERSONNEL DATA MODULE PDM

PERSON TASK RECORD

REQUIRED

INPUT PDM-01

RECORD IDENTIFIER

Record Name: T A S K (1 2 3 4)

Record Number: 0 5 5 (5 6 7)

Person Identifier: 2 6 3 7 8 7 8 0 4 (9 10 11 12 13 14 15 16 17 18)

Person Qualifier: (19 20 21 22)

Activity Units: 3.0 (24 25 26 27 28 29 30)

ACTIVITY/ASSIGNMENT

ACTIVITY: I N S T (33 34 35 36)

DISC/DEPT: C H E M (39 40 41 42)

COURSE LEVEL: 1 0 6 (45 46 47 48)

Weight Code: (51 52 53 54)

CONVERSION OF PERSONNEL DATA TO THE IEP ACTIVITY STRUCTURE

As described previously, the IEP activity structure is the framework for analysis for student, personnel, and financial data. To allow a correct linkage with data from SDM and ACM, personnel data contained on the Person Identifier Record and Person Task Record must be converted to the IEP activity structure. The four PDM elements that must be converted are described below and illustrated in Figure 34 for data on the two faculty members described in Figure 30 (and other faculty members assumed to be in NCHEMS U).

PERSON TYPE--For IEP purposes, any classifications coded in this field should be converted to a single category. (Detail recorded here may be used for other analyses, such as data preparation for the RRPM 1.6).

ACTIVITY--The activity code should be converted to the IEP subprogram within which the activity occurs. Examples of frequently encountered subprograms are 1.1., General Academic Instruction; 2.2., Individual or Project Research; 4.6., Academic Administration; 5.2., Social and Cultural Development; 5.3., Counseling and Career Guidance; and 5.6., Intercollegiate Athletics. (As noted in the description of SDM, disciplines properly included in instructional areas other than 1.1. General Academic Instruction should initially be converted to activity code '1.1.'. These codes then may be modified in the Data Management Module processing.)

DISC/DEPT--This element should be converted to the corresponding four-digit HEGIS codes for the discipline.

COURSE LEVEL--The course numbers typically entered in this field should be converted to the IEP codes of '.20', '.30', or '.50' for lower division, upper division, and graduate level courses, respectively.

As in the Student Data Module, a conversion table relating unique institutional codes to the IEP activity structure must be supplied to PDM. Dimension Definition Records and Dimension Conversion Records are used to describe these conversions. Figure 35 illustrates the records required to convert and define the personnel data shown in Figure 30.

The "conversion" for institutional codes must be provided on a Dimension Conversion Record and each IEP activity code must be defined on a Dimension Definition Record.

Figure 34
Conversion of Personnel Data

	FROM		TO	
	Institutional Codes	Institutional Names	IEP Activity Codes	IEP Activity Names
Activity (ACTI)	INST	INSTRUCTION	1.1.	INSTRUCTION
	ADMN	ADMINISTRATION	4.6.	ADMINISTRATION
	RESH	RESEARCH	2.2.	RESEARCH
Discipline (ROW)	CHEM	CHEMISTRY	1905	CHEMISTRY
	MATH	MATHEMATICS	1701	MATHEMATICS
	PSYC	PSYCHOLOGY	2001	PSYCHOLOGY
Course Levels (SROW)	000-299	LOWER DIVISION	.20	LOWER DIVISION
	300-499	UPPER DIVISION	.30	UPPER DIVISION
Person Type (TYPE)	all codes	various	ALL	ALL PERS TYPES

Figure 35
PDM Coding Forms

RECORD IDENTIFIER

Record Name: P E R S (1 2 3 4)

Record Number: 0 5 0 (5 6 7)

PERSONNEL DATA MODULE | **PDM**

PERSON IDENTIFIER RECORD

REQUIRED

INPUT PDM-01

Person Identifier: 263787804 (9 10 11 12 13 14 15 16 17 18)

Person Name: MARY JONES (49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64)

Data item to be converted and defined

Person Type: PROF (65 66 67 68)

RECORD IDENTIFIER

Record Name: T A S K (1 2 3 4)

Record Number: 0 5 5 (5 6 7)

PERSONNEL DATA MODULE | **PDM**

PERSON TASK RECORD

REQUIRED

INPUT PDM-01

Person Identifier: 263787804 (9 10 11 12 13 14 15 16 17 18)

Person Qualifier: (19 20 21 22)

Activity Units: 3.00 (24 25 26 27 28 29 30)

ACTIVITY/ASSIGNMENT

ACTIVITY: INST (33 34 35 36)

DISC DEPT: CHEM (39 40 41 42)

COURSE LEVEL: 106 (45 46 47 48)

Weight Code: (51 52 53 54)

*These data are converted (CNVT) and defined (DEFN) They are the "ACTI", "ROW", AND "SROW" dimensions respectively.

RECORD IDENTIFIER

Record Name: C N V T (1 2 3 4)

Record Number: 0 4 5 (5 6 7)

PERSONNEL DATA MODULE | **PDM**

DIMENSION CONVERSION RECORD

OPTIONAL

INPUT PDM-01

Dimension: ROW (10 11 12 13)

Matrix dimension. Other dimension that must be identified are: (ACTI, ROW, SROW, TYPE)

Code found on Task Record of Faculty Member

FROM FIELD

Values On Personnel File

Low End of Range: CHEM (16 17 18 19)

High End of Range: (28 29 30 31)

TO FIELD

IEP Activity Code

Defined Code: 1905 (40 41 42 43)

This record converts instituti nal codes on Faculty "PERS" and "TASK" Records to IEP Activity Codes.

RECORD IDENTIFIER

Record Name: D E F N (1 2 3 4)

Record Number: 0 4 0 (5 6 7)

PERSONNEL DATA MODULE | **PDM**

DIMENSION DEFINITION RECORD

REQUIRED

INPUT PDM-01

Dimension: ROW (10 11 12 13)

Matrix dimension. Same codes as found in "CNVT" record.

From "To Field" of "CNVT" Record

Code: 1905 (16 17 18 19)

Name: CHEMISTRY (28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43)

This record provides the name to the new code (IEP Activity Code) found in the "To Field" of the "CNVT" Record.

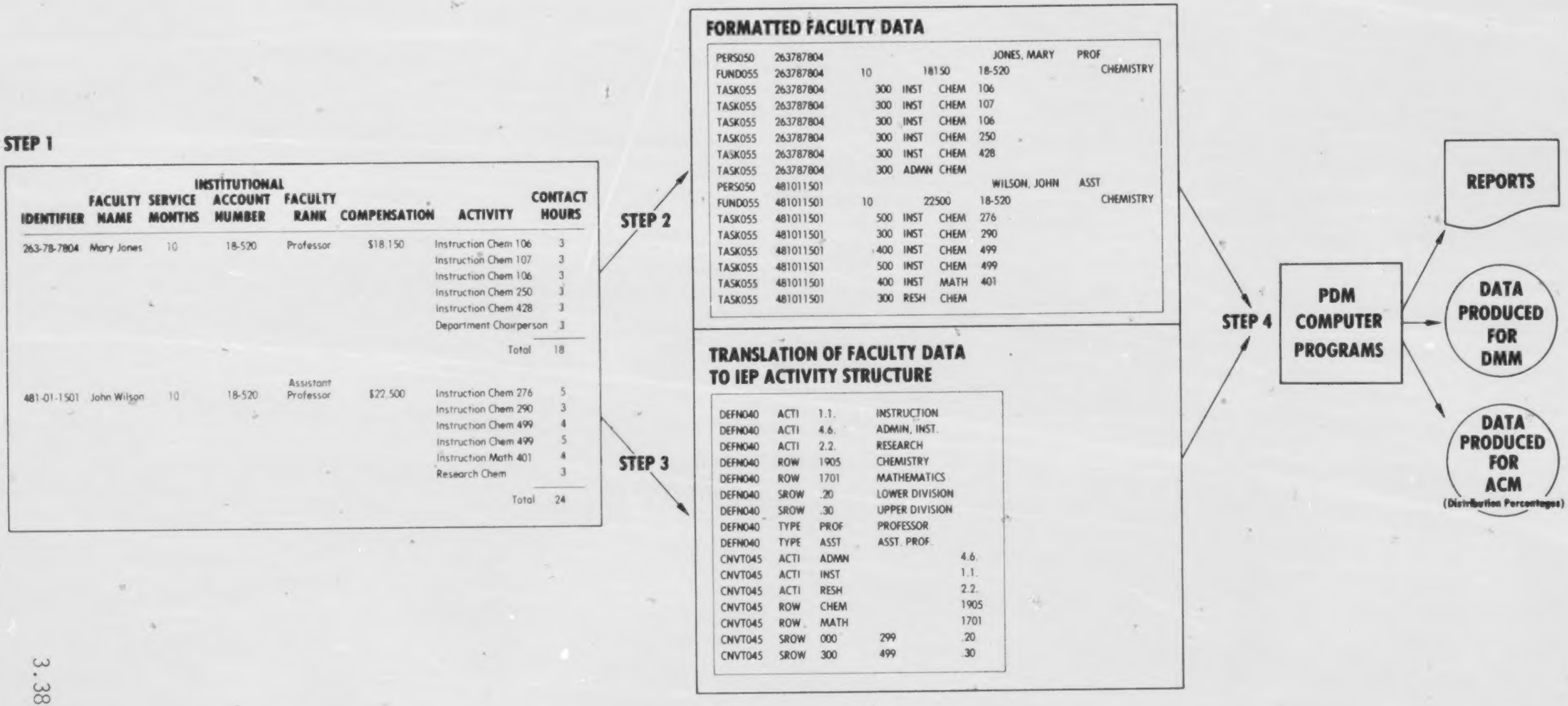
CONSTRUCTION OF DISTRIBUTION PERCENTAGES USING PDM

The data and steps required to implement the Personnel Data Module are illustrated in Figure 36. As shown in that figure, the first two steps are (1) identifying the source of faculty data and (2) recording these data in the format required by PDM. The third step is to provide to PDM the conversion table for converting institutional codes to the IEP activity structure. Similar to SDM, this is done by supplying all the unique institutional faculty rank, activity, discipline, and course level codes and the IEP activity structure codes that each institutional code converts to. In specifying these conversion codes, PDM must be informed which particular "dimension" (such as activity, rank, or discipline) is being defined. A Dimension Type is therefore included with each conversion instruction. Dimension Type codes of ACTI, ROW, SROW, and TYPE are used for activity, discipline, course level, and rank, respectively.

Figure 36 shows all of the Definition and Conversion Records required to convert the formatted faculty data illustrated in that figure.

PDM Step 4 brings together the faculty data and conversion data which then are submitted to the PDM computer software so that the reports for DMM data and distribution percentages can be provided.

Figure 36
Data Required for PDM



STEP 1

IDENTIFIER	FACULTY NAME	SERVICE MONTHS	INSTITUTIONAL ACCOUNT NUMBER	FACULTY RANK	COMPENSATION	ACTIVITY	CONTACT HOURS
263-78-7804	Mary Jones	10	18-520	Professor	$18,150	Instruction Chem 106	3
						Instruction Chem 107	3
						Instruction Chem 106	3
						Instruction Chem 250	3
						Instruction Chem 428	3
						Department Chairperson	3
						Total	18
481-01-1501	John Wilson	10	18-520	Assistant Professor	$22,500	Instruction Chem 276	5
						Instruction Chem 290	3
						Instruction Chem 499	4
						Instruction Chem 499	5
						Instruction Math 401	4
						Research Chem	3
						Total	24

FORMATTED FACULTY DATA

```
PERS050   263787804                                   JONES, MARY    PROF
FUND055   263787804      10            18150   18-520                   CHEMISTRY
TASK055   263787804         300  INST   CHEM   106
TASK055   263787804         300  INST   CHEM   107
TASK055   263787804         300  INST   CHEM   106
TASK055   263787804         300  INST   CHEM   250
TASK055   263787804         300  INST   CHEM   428
TASK055   263787804         300  ADMN   CHEM
PERS050   481011501                                   WILSON, JOHN   ASST
FUND055   481011501      10            22500   18-520                   CHEMISTRY
TASK055   481011501         500  INST   CHEM   276
TASK055   481011501         300  INST   CHEM   290
TASK055   481011501         400  INST   CHEM   499
TASK055   481011501         500  INST   CHEM   499
TASK055   481011501         400  INST   MATH   401
TASK055   481011501         300  RESH   CHEM
```

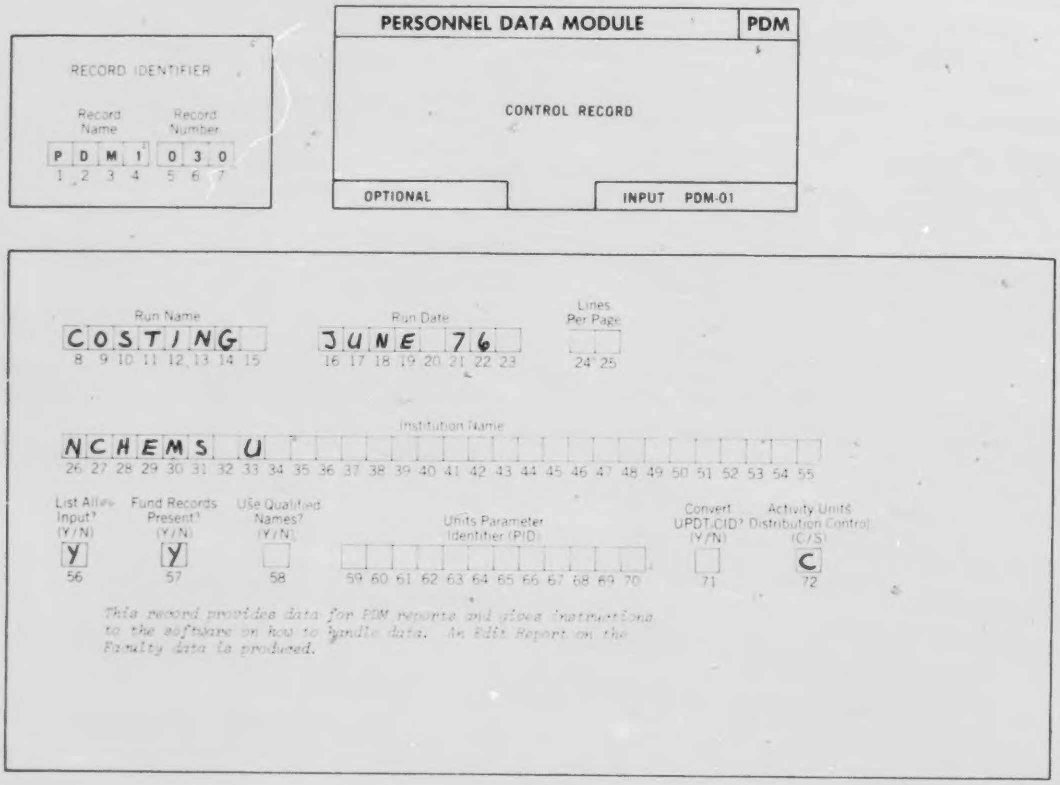
TRANSLATION OF FACULTY DATA TO IEP ACTIVITY STRUCTURE

```
DEFN040   ACTI   1.1.    INSTRUCTION
DEFN040   ACTI   4.6.    ADMIN, INST.
DEFN040   ACTI   2.2.    RESEARCH
DEFN040   ROW    1905    CHEMISTRY
DEFN040   ROW    1701    MATHEMATICS
DEFN040   SROW   .20     LOWER DIVISION
DEFN040   SROW   .30     UPPER DIVISION
DEFN040   TYPE   PROF    PROFESSOR
DEFN040   TYPE   ASST    ASST. PROF.
CNVT045   ACTI   ADMN                    4.6.
CNVT045   ACTI   INST                    1.1.
CNVT045   ACTI   RESH                    2.2.
CNVT045   ROW    CHEM                    1905
CNVT045   ROW    MATH                    1701
CNVT045   SROW   000     299             .20
CNVT045   SROW   300     499             .30
```

CONTROL RECORDS

Control records input to each PDM program provide the ability to select options available in the programs, such as variations in internal computations and levels of detail on output reports. Where the user does not complete an optional field, PDM will use default values. This section illustrates the control cards and the data items that should be filled in for processing data for the IEP project. Additional discussion of PDM features and control card fields is provided in the PDM technical documentation. Figures 37 through 42 illustrate the control records. (Note that PDM program four is run twice--once to obtain reports and once to obtain the crossover file for input to ACM.)

Figure 37
PDM1 Control Record



RECORD IDENTIFIER
Record Name (1–4): PDM1
Record Number (5–7): 030

PERSONNEL DATA MODULE | PDM
CONTROL RECORD
OPTIONAL
INPUT PDM-01

Run Name (8–15): COSTING
Run Date (16–23): JUNE 76
Lines Per Page (24–25):
Institution Name (26–55): NCHEMS U
List All Input? (Y/N) (56): Y
Fund Records Present? (Y/N) (57): Y
Use Qualified Names? (Y/N) (58):
Units Parameter Identifier (PID) (59–70):
Convert UPDT CID? (Y/N) (71):
Activity Units Distribution Control (C/S) (72): C

This record provides data for PDM reports and gives instructions to the software on how to handle data. An Edit Report on the Faculty data is produced.

Figure 38
PDM2 Control Record

PERSONNEL DATA MODULE | **PDM**

CONTROL RECORD

OPTIONAL

INPUT PDM-02

RECORD IDENTIFIER

Record Name: P D M 2 (1 2 3 4)
Record Number: 0 7 0 (5 6 7)

Run Name: COSTING (8 9 10 11 12 13 14 15)
Run Date: JUNE 76 (16 17 18 19 20 21 22 23)
Lines Per Page: ☐☐ (24 25)
Print Option: ☐ (27)
Heading Option: ☐ (29)

A report is produced displaying the faculty data.

Figure 39
PDM3 Control Record

PERSONNEL DATA MODULE | **PDM**

CONTROL RECORD

OPTIONAL

INPUT PDM-03

RECORD IDENTIFIER

Record Name: P D M 3 (1 2 3 4)
Record Number: 0 7 5 (5 6 7)

Run Name: COSTING (8 9 10 11 12 13 14 15)
Run Date: JUNE, 76 (16 17 18 19 20 21 22 23)
Lines Per Page: ☐☐ (24 25)
Print Option: ☐ (26)
RRPM "DISC" Records? (Y/N): ☐ (27)
RRPM "PROD" Records? (Y/N): ☐ (28)
RRPM "RMIX" Records? (Y/N): ☐ (29)
RRPM "FSAL" Records? (Y/N): ☐ (30)
Insert Type In PID? (Y/N): N (31)
DMM Function (C/U/E/R): ☐ (32)
Heading Option: ☐ (33)
Which Activity (ACTI) For RRPM?: ☐☐☐☐ (34 35 36 37)
Productivity Ratio Factor: ☐☐.☐☐ (38 39 40 41)

Person Units Updates? (Y/N): Y (42)
Parameter Identifier: PERSON.UNITS (43 44 45 46 47 48 49 50 51 52 53 54)

Compensation Updates? (Y/N): Y (55)
Parameter Identifier: COMPENSATION (56 57 58 59 60 61 62 63 64 65 66 67)

Productivity Ratio Updates? (Y/N): N (68)
Parameter Identifier: ☐☐☐☐☐☐☐☐☐☐☐☐ (69 70 71 72 73 74 75 76 77 78 79 80)

Figure 40
PDM4 Control Record

RECORD IDENTIFIER

Name Record: P D M 4 (1 2 3 4)
Number Record: 0 8 0 (5 6 7)

PERSONNEL DATA MODULE | **PDM**

CONTROL RECORD

OPTIONAL

INPUT = PDM-04

Run Name (8–15): COSTING

Run Date (16–23): JUNE 76

Lines Per Page (24 25):

Institution's General Ledger Input? (Y/N) (27): N

Cross File Output? (Y/N) (29): N

Insert Type in PID? (Y/N) (31): N

CROS Parameter Identifier (33–44):

Print Option (46):

Distribution Option (48):

Heading Option (Y/N) (50):

This report requests that a report be produced displaying the faculty data.

Figure 41
PDM4 Control Record

RECORD IDENTIFIER

Name Record: P D M 4 (1 2 3 4)
Number Record: 0 8 0 (5 6 7)

PERSONNEL DATA MODULE | **PDM**

CONTROL RECORD

OPTIONAL

INPUT = PDM-04

Run Name (8–15): COSTING

Run Date (16–23): JUNE 76

Lines Per Page (24 25):

Institution's General Ledger Input? (Y/N) (27): Y

Cross File Output? (Y/N) (29): Y

Insert Type in PID? (Y/N) (31): N

CROS Parameter Identifier (33–44):

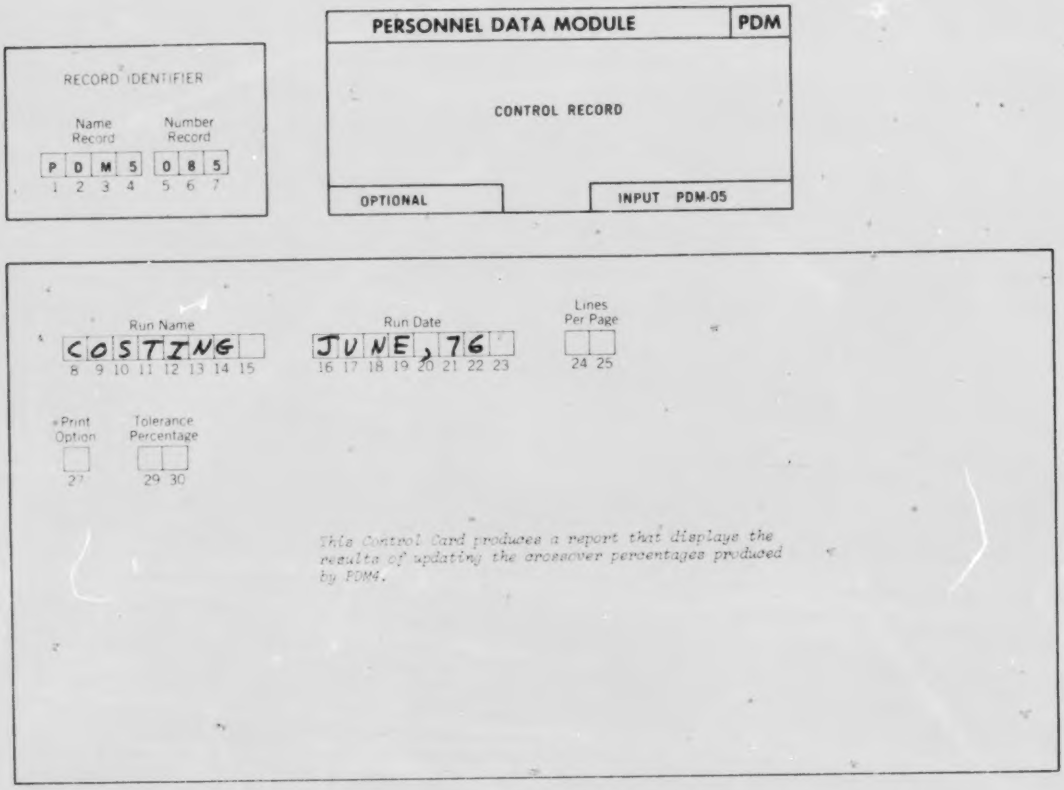
Print Option (46):

Distribution Option (48):

Heading Option (Y/N) (50):

This record requests that the distribution percentages be prepared for input to ACM (i.e., the crossover file will be created). Also, a report illustrating these percentages will be produced.

Figure 42
PDM5 Control Record



RECORD IDENTIFIER

Name Record: P D M 5 (1 2 3 4)
Number Record: 0 8 5 (5 6 7)

PERSONNEL DATA MODULE | **PDM**

CONTROL RECORD

OPTIONAL

INPUT PDM-05

Run Name: COSTING (8 9 10 11 12 13 14 15)
Run Date: JUNE, 76 (16 17 18 19 20 21 22 23)
Lines Per Page: (24 25)
*Print Option: (27)
Tolerance Percentage: (29 30)

This Control Card produces a report that displays the results of updating the crossover percentages produced by PDM4.

ADDITIONAL PDM TOPICS

This section discusses other PDM options that may be used in completing an IEP cost study. The need for these options depends on the particular implementation approach being used and on required data adjustments that may have to be made. Understanding the features available should enable the individuals responsible for implementation to recognize whether these features may be useful in a particular implementation.

Weight Code

The Person Task Record described on page 3.32 contains a Weight Code field that permits the value in the Activity Units field to be changed according to a weighting factor supplied via a Weighting Control Record. The use of this feature is similar to the weighting feature in the Student Data Module.

An example of the use of this feature is to identify laboratory sections with an 'L' in the weight code field and the appropriate number of contact hours in the activity units field. When PDM is run the lab sections can either be included in the cost analysis or excluded by using a Weighting Control Record that assigns a weight of zero to all tasks with 'L' in the weight code field.

Restricted Funds

The Funding Record and the Person Task Record both contain a Person Qualifier field. The purpose of this field is to enable the user to restrict the distribution of a compensation amount to only a portion of an individual's activities. Specifically, compensation on a Funding Account Record with a particular code in the Person Qualifier field will be distributed only to activities on Person Task Records that have the same Person Qualifier code. For example, research activities that are funded only by research accounts can be isolated so that only research dollars are assigned to research activities. Figure 43 illustrates how this may be accomplished.

Figure 43
Restricted Funds Option

RECORD IDENTIFIER

Record Name	Record Number
F U N D	0 5 5
1 2 3 4	5 6 7

PERSONNEL DATA MODULE | **PDM**

FUNDING ACCOUNT RECORD

REQUIRED

INPUT PDM-01

Person Identifier: 481011501 (9–18)

Person Qualifier: RES (19–22) ← *This field links the dollars to the activity (Task Record) with the same code, as illustrated below.*

Person Units: 10.00 (23–29)

Compensation: 2,500. (30–45)

Funding Account Identifier: 18-520 (46–69)

Account Name: CHEMISTRY R (70–80)

RECORD IDENTIFIER

Record Name	Record Number
T A S K	0 5 5
1 2 3 4	5 6 7

PERSONNEL DATA MODULE | **PDM**

PERSON TASK RECORD

REQUIRED

INPUT PDM-01

Person Identifier: 481011501 (9–18)

Person Qualifier: RES (19–22)

Activity Units: 3.00 (24–30)

ACTIVITY/ASSIGNMENT

ACTIVITY	DISC/DEPT	COURSE LEVEL
RESH	CHEM	
33 34 35 36	39 40 41 42	45 46 47 48

Weight Code: (51–54)

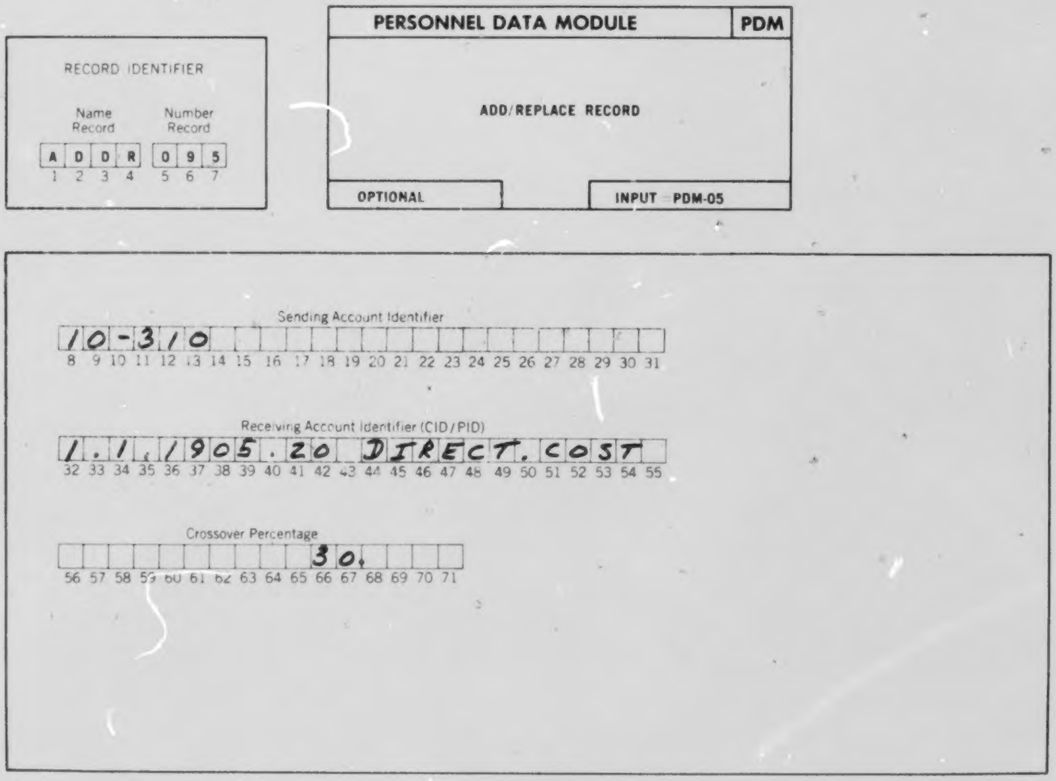
Adjustments to PDM-Produced Distribution Percentages

The first four programs in PDM process institutional data to produce the distribution percentages that serve as input to the Account Crossover Module. Occasionally, there is the need to adjust these distribution percentages prior to their use in ACM. A fifth PDM program provides the capability for adjusting these percentages. The three methods typically used in updating these percentages are described below.

1. Add/Replace

The Add/Replace Record shown in Figure 44 permits adding a new crossover record or replacing an existing record. This record may be used, for example, to alter the PDM-produced distribution percentages if it is known that different percentages are more accurate.

Figure 44
Add/Replace Record



RECORD IDENTIFIER

Name Record: A D D R (1 2 3 4)
Number Record: 0 9 5 (5 6 7)

PERSONNEL DATA MODULE | PDM

ADD/REPLACE RECORD

OPTIONAL | INPUT PDM-05

Sending Account Identifier: 10-310 (8–31)

Receiving Account Identifier (CID/PID): 1.1.1905.20 DIRECT.COST (32–55)

Crossover Percentage: 30. (56–71)

Figure 44 illustrates a record that will cross over 30 percent of institutional account 10-310 to IEP activity center 1.1.1905.20.

If a matching crossover instruction is not in the crossover file, the crossover command will be added to the file. If a matching instruction already exists on the file, the distribution percentage will be replaced with the value of 30 percent.

2. Rescale

The Rescale Distribution Set Record makes it possible to change the value of the distribution percentages that have been produced for a single institutional account. One typical use of this feature arises because PDM will prepare distribution percentages that total 100 percent for each account even if not all of the account's expenditures have been analyzed by PDM. For example, because PDM may have been given insufficient data to analyze account 10-310, 100 percent of the account may be distributed to five instructional accounts, when, in fact, only 70 percent of the account should have been distributed to the five accounts, with the remaining 30 percent distributed to academic administration. Figure 45 illustrates a Rescale Record that specifies that the distribution percentages for account 10-310 should be rescaled so that only 70 percent of the account will be distributed to the five instructional accounts. Figure 46 illustrates the original and rescaled distribution percentages resulting from the use of the rescale instruction shown in Figure 45. Presumably, an Add/Replace Record then will be used to cause the account's remaining 30 percent to be distributed to academic administration.

Figure 45
Rescale Command

RECORD IDENTIFIER

Record Name				Record Number		
R	E	S	C	9	9	5
1	2	3	4	5	6	7

PERSONNEL DATA MODULE | **PDM**

RESCALE DISTRIBUTION SET RECORD

OPTIONAL

INPUT = PDM-05

Sending Account Identifier (8–31): 10-310

New Set Percent (56–71): 70.

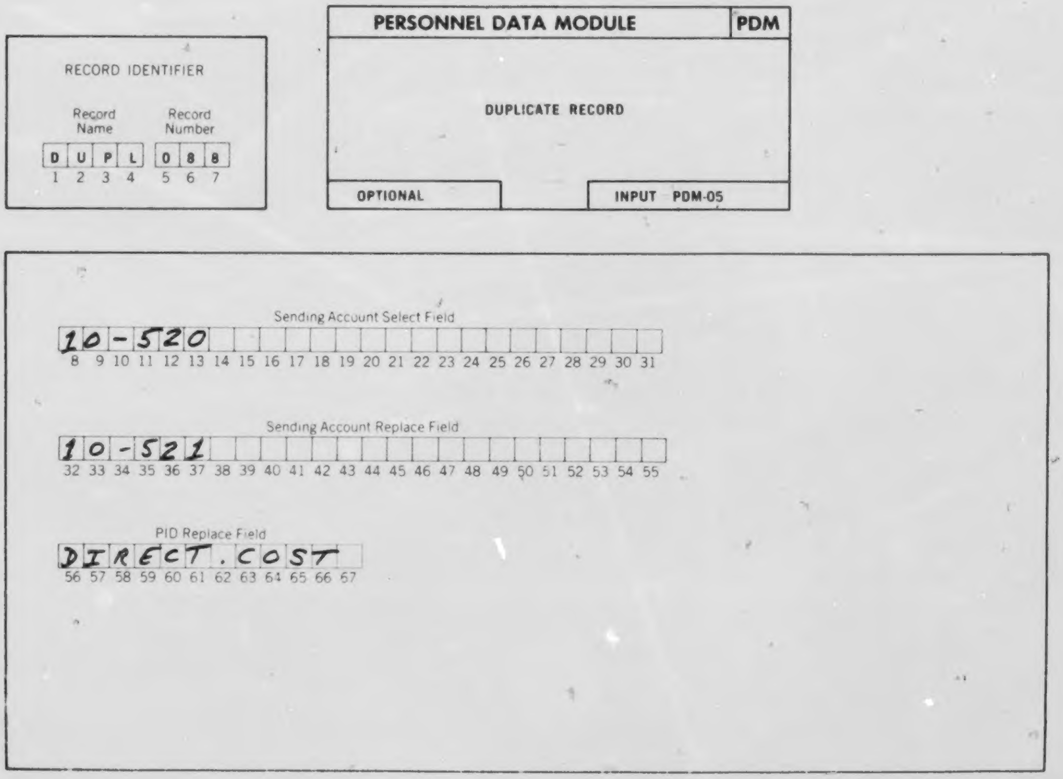
Figure 46
Rescaling Example

Account	IEP Activity Structure	Original Distribution Percentages	Distribution Percentages Rescaled to 70%
10 – 310	1.1.0401.20	10%	7%
	1.1.0401.30	20%	14%
	1.1.1901.20	30%	21%
	1.1.1901.30	10%	7%
	1.1.1901.50	30%	21%
		100%	70%

3. Duplicate Record

Finally, the Duplicate Record may be used to duplicate the distribution percentages for one account so they will be used by another account. The example in Figure 47 specifies that account 10-521 is to be crossed over in exactly the same pattern as account 10-520.

Figure 47
Duplicate Record



RECORD IDENTIFIER

Record Name: D U P L (1 2 3 4)
Record Number: 0 8 8 (5 6 7)

PERSONNEL DATA MODULE | **PDM**

DUPLICATE RECORD

OPTIONAL
INPUT PDM-05

Sending Account Select Field (8–31): 10-520
Sending Account Replace Field (32–55): 10-521
PID Replace Field (56–67): DIRECT.COST

EXAMPLE OF PDM DATA

Figure 48 provides an example of most of the data required by PDM to produce and display the crossover data required by ACM and the data passed to DMM. These data were derived from the data in Figure 30. No other data are required to run the PDM programs.

PDM REPORTS

Figures 49 and 50 illustrate the Consumption and Contribution Reports produced by the Personnel Data Module.

The Consumption Report shows the personnel resources "consumed" for each discipline and course-level. Shown for each of these activity centers are the accounts from which the activity center "consumed" personnel resources and the specific individuals who had tasks in the activity center.

The Contribution Report shows for each institutional account (described on a PDM Funding Account Record) the activity centers to which the account contributed and the specific individuals with tasks in the activity center who were paid from the account.

Figure 48
Sample PDM Input

```
00000000011111111112222222222333333333344444444445555555555666666666677777777778
12345678901234567890123456789012345678901234567890123456789012345678901234567890

PDM1030COSTING JUNE, 76  N C H E M S  U                YYY
DEFN040  ACTI  1.1.        INSTRUCTION
DEFN040  ACTI  4.6.        ADMIN,INST
DEFN040  ACTI  2.2.        RESEARCH
DEFN040  ROW   1905        CHEMISTRY
DEFN040  ROW   1701        MATHEMATICS
DEFN040  SROW  .20         LOWER DIVISION
DEFN040  SROW  .30         UPPER DIVISION
DEFN040  TYPE  PROF        PROFESSOR
DEFN040  TYPE  ASST        ASST. PROF.
CNVT045  ACTI  ADMN                    4.6.
CNVT045  ACTI  INST                    1.1.
CNVT045  ACTI  RESH                    2.2.
CNVT045  ROW   CHEM                    1905
CNVT045  ROW   MATH                    1701
CNVT045  SROW   000         299        .20
CNVT045  SROW   300         499        .30
```

These records are:

1. *Control record for PDM1*
2. *"DEFN" and "CNVT" records for the data submitted for Jones and Wilson listed below.*

```
PERS050  263787804                              JONES, MARY     PROF
FUND055  263787804       10         18150    18-520                  CHEMISTRY
TASK055  263787804         300  INST  CHEM   106
TASK055  263787804         300  INST  CHEM   107
TASK055  263787804         300  INST  CHEM   106
TASK055  263787804         300  INST  CHEM   250
TASK055  263787804         300  INST  CHEM   428
TASK055  263787804         300  ADMN  CHEM
PERS050  481011501                              WILSON, JOHN    ASST
FUND055  481011501       10         22500    18-520                  CHEMISTRY
TASK055  481011501         500  INST  CHEM   276
TASK055  481011501         300  INST  CHEM   290
TASK055  481011501         400  INST  MATH   401
TASK055  481011501         400  INST  CHEM   499
TASK055  481011501         500  INST  CHEM   499
TASK055  481011501         300  RESH  CHEM
```

These are the faculty data for Jones and Wilson

```
PDM2070COSTING JUNE, 76   0 N

PDM3075COSTING JUNE, 76  0    N          YPERSON.UNITSYCOMPENSATIONN

PDM4080COSTING JUNE, 76   N N N              0

PDM4080COSTING JUNE, 76   N Y N              0

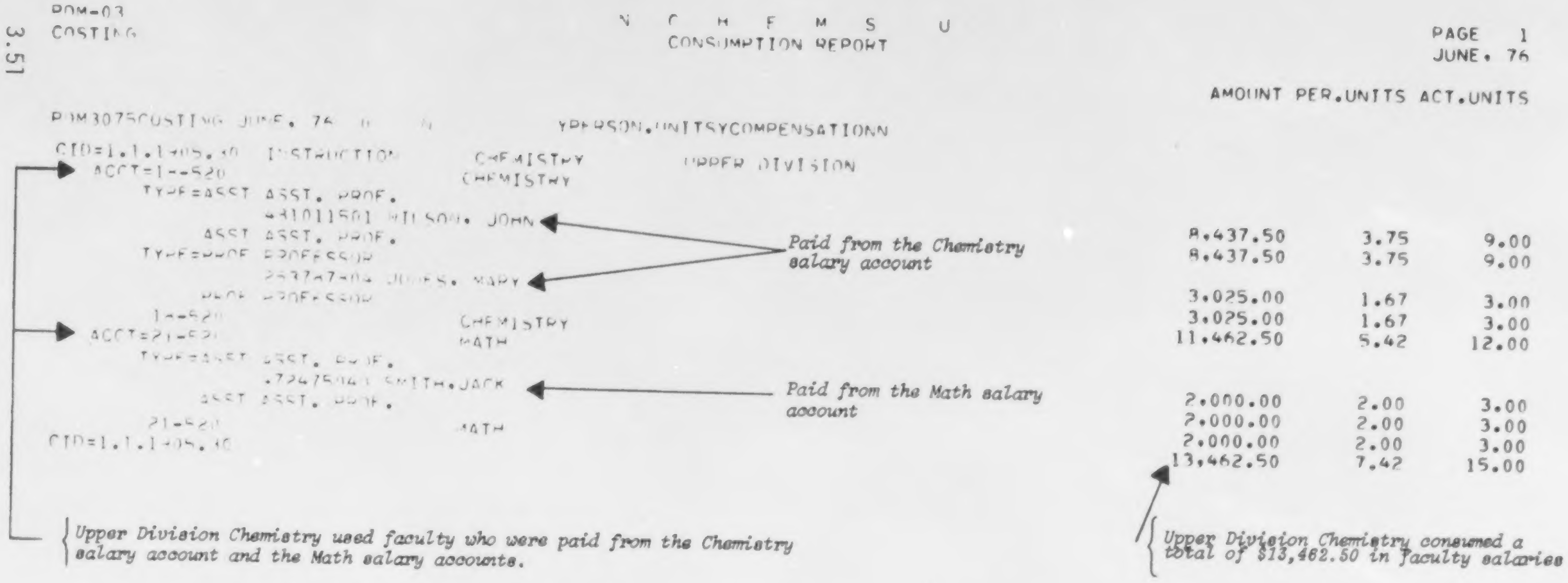
PDM5085COSTING JUNE, 76   0
DUPL08818-520                  18-523
DUPL08818-520                  18-528
DUPL08818-520                  18-580
DUPL08818-520                  18-581
DUPL08818-520                  18-584

00000000011111111112222222222333333333344444444445555555555666666666677777777778
12345678901234567890123456789012345678901234567890123456789012345678901234567890
```

PDM5 control card and data for adjusting cross-over data produced by PDM4. (Partial list of DUPL records)

Control Cards for producing reports, DMM data and crossover data for ACM.

Figure 49
PDM Consumption Report



```
PDM-03                                 N   C   H   E   M   S    U                                               PAGE    1
COSTING                                    CONSUMPTION REPORT                                                   JUNE, 76

                                                                                              AMOUNT PER.UNITS ACT.UNITS
PDM3075COSTING JUNE, 76  0    N            YPERSON,UNITSYCOMPENSATIONN
CID=1.1.1405.30  INSTRUCTION     CHEMISTRY       UPPER DIVISION
  ACCT=1--520                   CHEMISTRY
      TYPE=ASST ASST. PROF.
                431011501 WILSON, JOHN                                                       8,437.50      3.75       9.00
           ASST ASST. PROF.                                                                  8,437.50      3.75       9.00
      TYPE=PROF PROFESSOR
                253747404 JONES, MARY                                                        3,025.00      1.67       3.00
           PROF PROFESSOR                                                                    3,025.00      1.67       3.00
     1--520                     CHEMISTRY                                                   11,462.50      5.42      12.00
  ACCT=21-520                   MATH
      TYPE=ASST ASST. PROF.
                472475041 SMITH,JACK                                                         2,000.00      2.00       3.00
           ASST ASST. PROF.                                                                  2,000.00      2.00       3.00
     21-520                     MATH                                                         2,000.00      2.00       3.00
CID=1.1.1405.30                                                                             13,462.50      7.42      15.00
```

Paid from the Chemistry salary account

Paid from the Math salary account

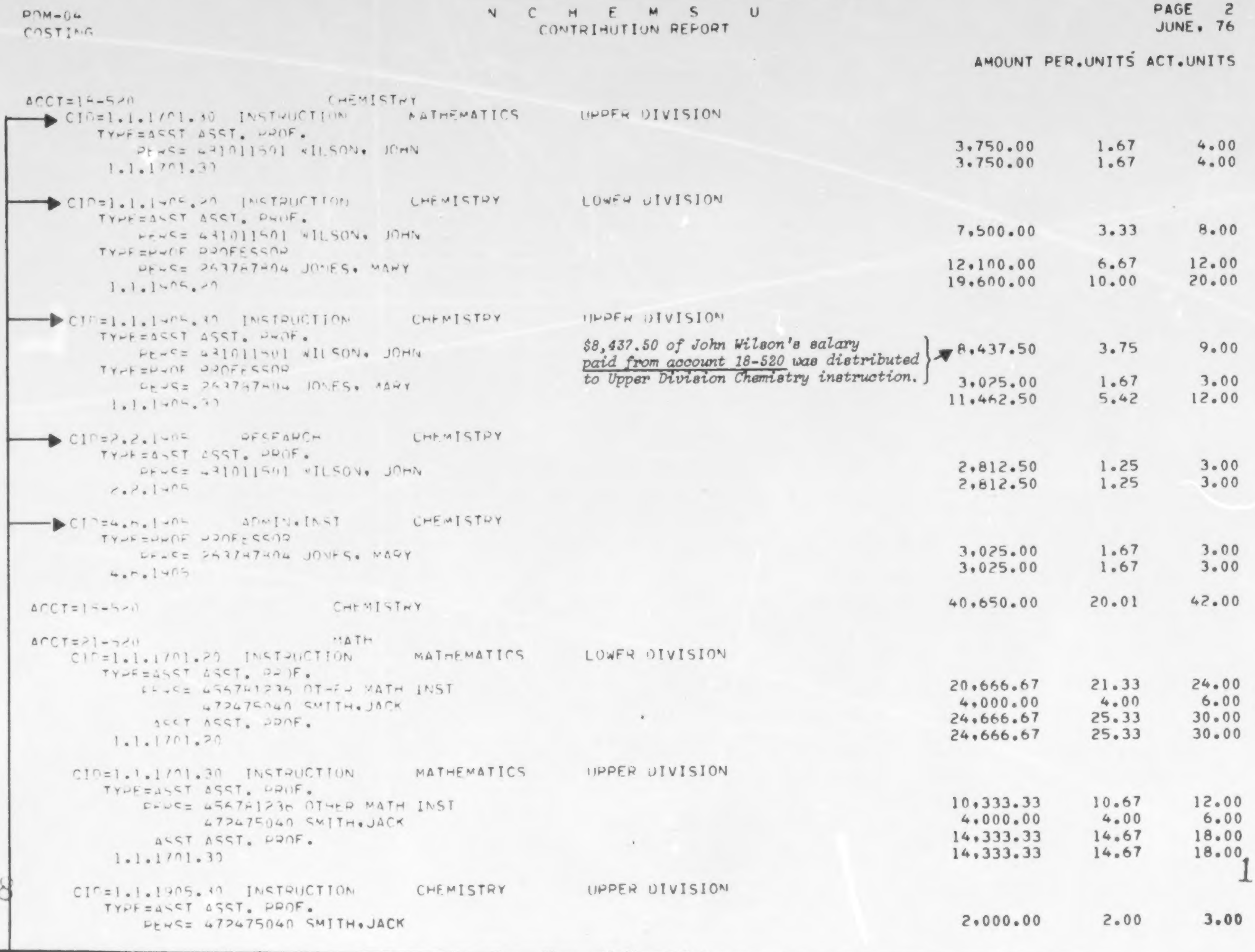
Upper Division Chemistry used faculty who were paid from the Chemistry salary account and the Math salary accounts.

Upper Division Chemistry consumed a total of $13,462.50 in faculty salaries

Note: Consumption shown only for Upper Division Chemistry instruction.

Figure 50

PDM Contribution Report



```
PDM-04                              N   C   H   E   M   S     U                                 PAGE  2
COSTING                                  CONTRIBUTION REPORT                                    JUNE, 76

                                                                             AMOUNT PER.UNITS ACT.UNITS

ACCT=18-520                    CHEMISTRY
    CID=1.1.1701.30  INSTRUCTION        MATHEMATICS       UPPER DIVISION
      TYPE=ASST ASST. PROF.
          PERS= 431011501 WILSON, JOHN                                      3,750.00     1.67      4.00
       1.1.1701.30                                                          3,750.00     1.67      4.00

    CID=1.1.1905.20  INSTRUCTION        CHEMISTRY         LOWER DIVISION
      TYPE=ASST ASST. PROF.
          PERS= 431011501 WILSON, JOHN                                      7,500.00     3.33      8.00
      TYPE=PROF PROFESSOR
          PERS= 263787804 JONES, MARY                                      12,100.00     6.67     12.00
       1.1.1905.20                                                         19,600.00    10.00     20.00

    CID=1.1.1905.30  INSTRUCTION        CHEMISTRY         UPPER DIVISION
      TYPE=ASST ASST. PROF.
          PERS= 431011501 WILSON, JOHN                                      8,437.50     3.75      9.00
      TYPE=PROF PROFESSOR
          PERS= 263787804 JONES, MARY                                       3,025.00     1.67      3.00
       1.1.1905.30                                                         11,462.50     5.42     12.00

    CID=2.2.1905      RESEARCH          CHEMISTRY
      TYPE=ASST ASST. PROF.
          PERS= 431011501 WILSON, JOHN                                      2,812.50     1.25      3.00
       2.2.1905                                                             2,812.50     1.25      3.00

    CID=4.6.1905      ADMIN.INST        CHEMISTRY
      TYPE=PROF PROFESSOR
          PERS= 263787804 JONES, MARY                                       3,025.00     1.67      3.00
       4.6.1905                                                             3,025.00     1.67      3.00

ACCT=18-520                    CHEMISTRY                                   40,650.00    20.01     42.00

ACCT=21-520                    MATH
    CID=1.1.1701.20  INSTRUCTION        MATHEMATICS       LOWER DIVISION
      TYPE=ASST ASST. PROF.
          PERS= 456781236 OTHER MATH INST                                  20,666.67    21.33     24.00
                472475040 SMITH,JACK                                        4,000.00     4.00      6.00
        ASST ASST. PROF.                                                   24,666.67    25.33     30.00
       1.1.1701.20                                                         24,666.67    25.33     30.00

    CID=1.1.1701.30  INSTRUCTION        MATHEMATICS       UPPER DIVISION
      TYPE=ASST ASST. PROF.
          PERS= 456781236 OTHER MATH INST                                  10,333.33    10.67     12.00
                472475040 SMITH,JACK                                        4,000.00     4.00      6.00
        ASST ASST. PROF.                                                   14,333.33    14.67     18.00
       1.1.1701.30                                                         14,333.33    14.67     18.00

    CID=1.1.1905.30  INSTRUCTION        CHEMISTRY         UPPER DIVISION
      TYPE=ASST ASST. PROF.
          PERS= 472475040 SMITH,JACK                                        2,000.00     2.00      3.00
```

$8,437.50 of John Wilson's salary paid from account 18-520 was distributed to Upper Division Chemistry instruction.

ACCOUNT CROSSOVER MODULE

ACCOUNT CROSSOVER MODULE (ACM)

OVERVIEW

The Account Crossover Module crosses over expenditures associated with each account in the institution's accounting system to the IEP Activity Structure. This is Step 3 in the IEP implementation process. In performing this crossover, the Account Crossover Module uses the institution's general ledger file and crossover instructions that indicate how institutional accounts are to be crossed over to the IEP Activity Structure (or some intermediate account structure). As stated in the PDM description, the crossover instructions for the institution's instructional accounts are prepared by the Personnel Data Module and the instructions for the noninstructional accounts are prepared manually by the user. The Account Crossover Module produces as output (1) reports describing the crossovers performed and (2) either a new general ledger file (for input to subsequent ACM runs) or input to the Data Management Module.

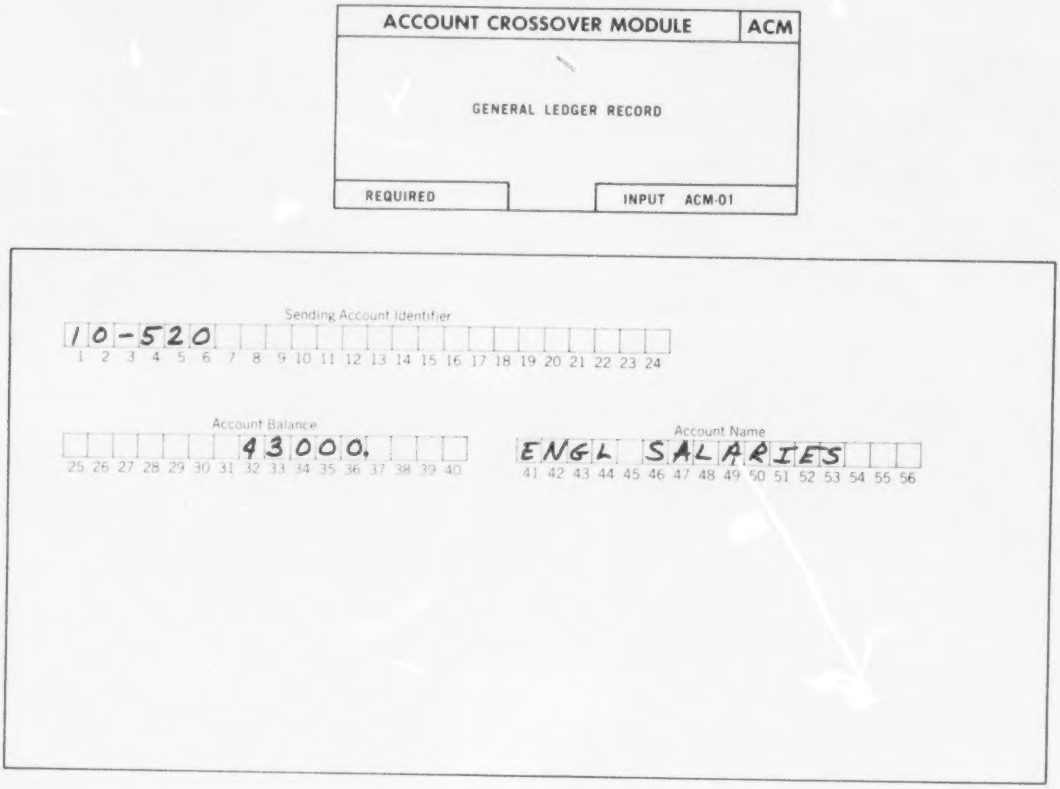
DATA REQUIREMENTS FOR ACM

Prior to providing a comprehensive example of the typical use of the Account Crossover Module, the several basic types of input data and features of the ACM will be described.

The General Ledger

Before any crossing over can be performed, the institutional accounts that are to be crossed over must be prepared for input to ACM. The General Ledger Record shown in Figure 51 is used to provide data concerning each account. (In practice, this input form is not actually used to code each account but is used merely to show the format in which accounts are directly coded.)

Figure 51
ACM General Ledger Record



ACCOUNT CROSSOVER MODULE — ACM

GENERAL LEDGER RECORD

REQUIRED

INPUT ACM-01

Sending Account Identifier (1–24): 10-520

Account Balance (25–40): 43000.

Account Name (41–56): ENGL SALARIES

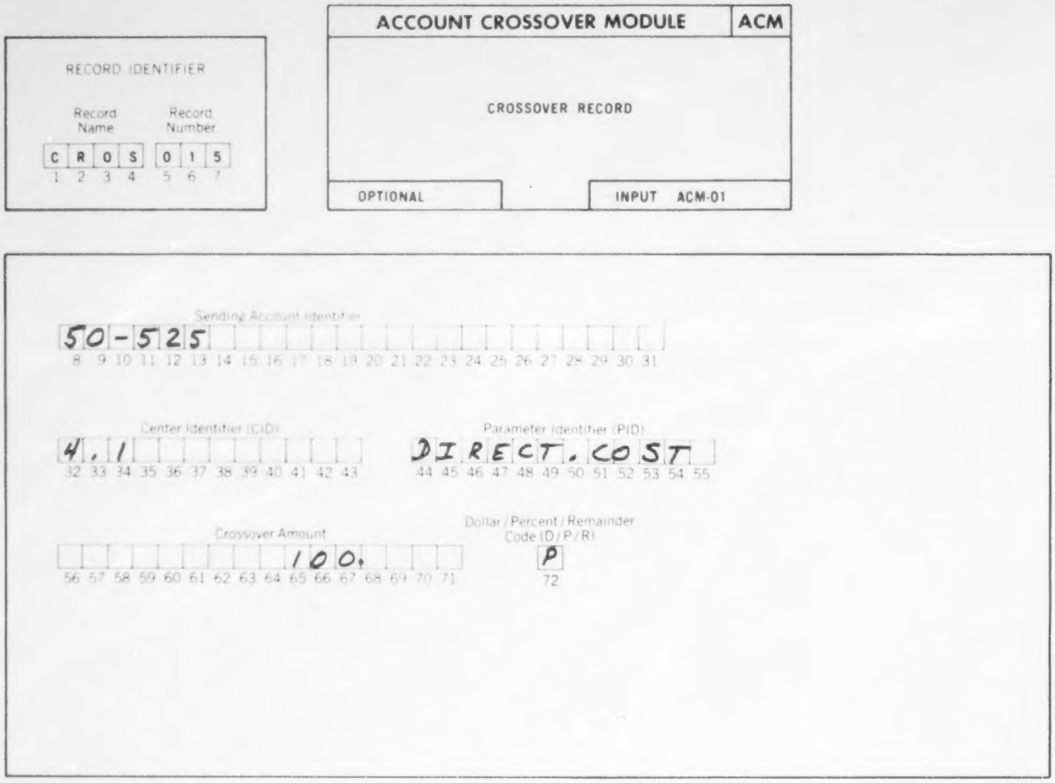
As suggested by the example, expenditures at a level of detail describing both the institutional organizational unit and the object of expenditure should be supplied to the ACM. For most institutions, from one to three thousand general ledger records will be prepared. However, large institutions may have twenty or thirty thousand of these records.

Crossover Instructions

The Account Crossover Module accepts two basic types of crossover instructions. The Crossover Record shown in Figure 52 is used to cross over a single specified account. In this example, 100 percent of the dollars associated with account 50-525 will be crossed over to activity center 4.1.

As suggested on the Crossover Record, a specific number of dollars could also be crossed from an account by entering 'D' in the Dollar/Percent/Remainder field and then coding the actual number of dollars in the Crossover Amount field. As a third option, the "remainder" of the account may be crossed over by leaving the Crossover Amount field blank and entering 'R' in the last field. This option eliminates the need for manually calculating the expected remaining balance in an account if other crossover instructions have been used to cross portions of the account to other activity centers. Only one "remainder" instruction can be supplied for an account and ACM will process the "remainder" instruction only after processing all other instructions for the account.

Figure 52
Crossover Record



RECORD IDENTIFIER

Record Name: C R O S
1 2 3 4

Record Number: 0 1 5
5 6 7

ACCOUNT CROSSOVER MODULE | ACM

CROSSOVER RECORD

OPTIONAL

INPUT ACM-01

Sending Account Identifier: 50-525
8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

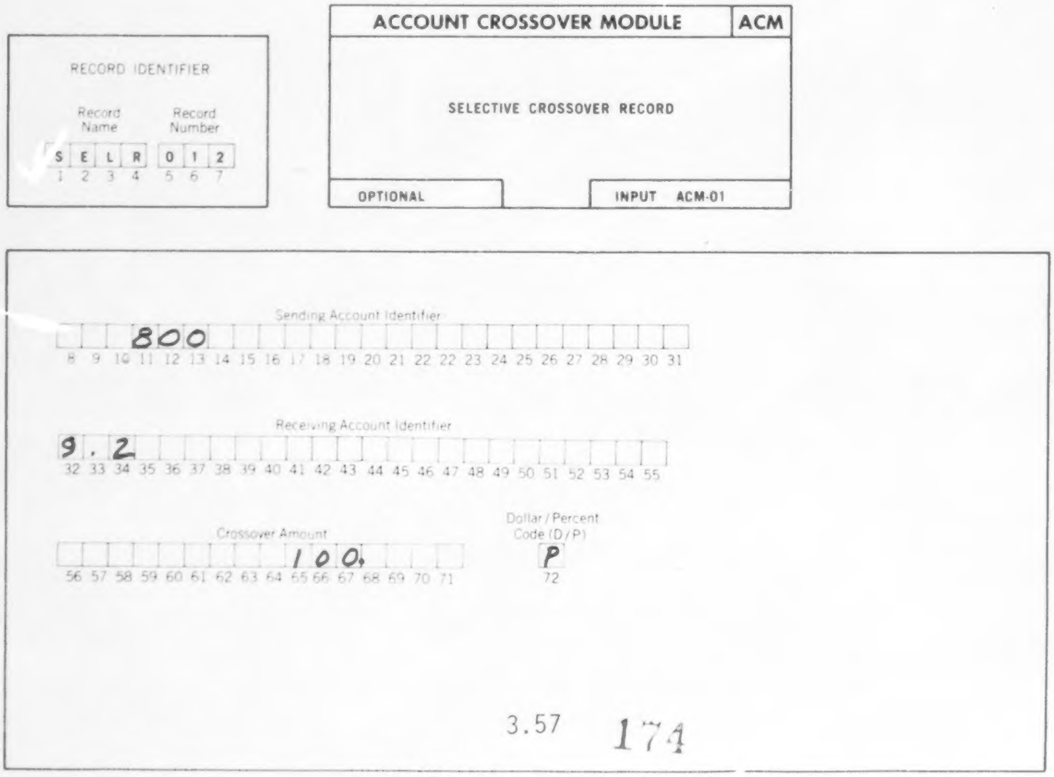
Center Identifier (CID): 4.1
32 33 34 35 36 37 38 39 40 41 42 43

Parameter Identifier (PID): DIRECT.COST
44 45 46 47 48 49 50 51 52 53 54 55

Crossover Amount: 100.
56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71

Dollar / Percent / Remainder Code (D/P/R): P
72

Figure 53
Selective Crossover Record



RECORD IDENTIFIER

Record Name: S E L R
1 2 3 4

Record Number: 0 1 2
5 6 7

ACCOUNT CROSSOVER MODULE | ACM

SELECTIVE CROSSOVER RECORD

OPTIONAL

INPUT ACM-01

Sending Account Identifier: 800
8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 22 23 24 25 26 27 28 29 30 31

Receiving Account Identifier: 9.2
32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55

Crossover Amount: 100.
56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71

Dollar / Percent Code (D/P): P
72

The second basic crossover instruction is the Selective Crossover illustrated in Figure 53. The use of this instruction effectively causes only specified (that is, non-blank) positions of general ledger account identifiers to be compared to the crossover instructions. If these specified positions are identical, the account will be crossed over as specified in the rest of the instruction. In Figure 53, for example, all accounts with 800 in the fourth through sixth positions will be "selected" and crossed over.

Mask Record

The Mask Record shown in Figure 54 provides another way for the user to specify that only certain portions of the general ledger account identifier are to be compared to the crossover instructions to determine if an account is to be crossed over by a particular instruction. Any non-blank position in the mask pattern field indicates that these positions are not to be used in the comparison. The only positions in the general ledger account identifier and the crossover instruction that will be compared are those that contain a blank as the corresponding character in the mask pattern. In Figure 54 the mask pattern will effectively cause account positions four, five, and six to be ignored for account identifier/crossover instruction comparison purposes. As an example of the use of the mask feature, assume that a CROS instruction specifies that 100 percent of account 10-580 is to be crossed over to IEP activity center 4.1., Libraries. If the mask shown in Figure 54 was present in the same run then accounts 10-581, 10-582, and all other accounts with '10-' in the first three positions would be crossed over to 4.1, Libraries.

Figure 54
Mask Record

RECORD IDENTIFIER

Record Name				Record Number		
M	A	S	K	0	0	8
1	2	3	4	5	6	7

ACCOUNT CROSSOVER MODULE | **ACM**

MASK RECORD

OPTIONAL

INPUT ACM-01

Mask Pattern

			X	X	X																		
9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32

Mask Character

34

TYPICAL ACM USAGE

Several runs through ACM are usually necessary to completely (and most easily) cross over institutional accounts to the IEP activity structure. An overview of these runs and the purpose of each run or type of run is shown in Figure 55.

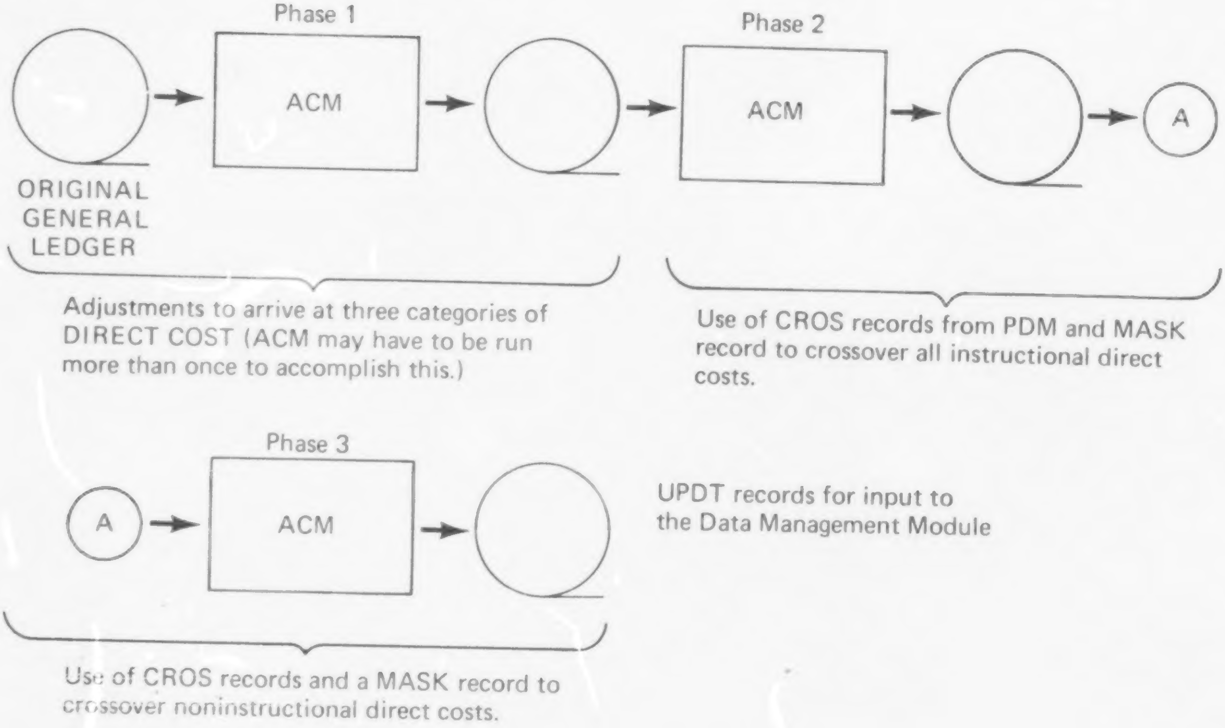
A description of crossing over institutional accounts using ACM is made easier by first separating institutional general ledger accounts into three main categories. These are:

- Instructional direct costs--faculty compensation
- Instructional direct costs--other than faculty compensation
- Noninstructional direct costs.

Separating institutional accounts into these categories is done in the Phase 1 run(s) of the ACM, as shown in Figure 55, and consists primarily of making adjustments to the general ledger accounts so that expenditures that remain associated with institutional organizational units conform to the IEP direct cost definition. (Typical adjustments and the IEP definition of direct cost are described on pages 2.16 and 2.25.) Once this initial categorization is done, the remaining two phases of the crossover process are relatively easy.

In the second phase, the CROS records produced by the Personnel Data Module (PDM) are used to cross over all salary (or compensation) accounts analyzed by the PDM. These accounts should consist of all of the

Figure 55
Typical Run Sequence Through ACM


Phase 1
ACM
Phase 2
ACM
A
ORIGINAL GENERAL LEDGER
Phase 3
A
ACM

Adjustments to arrive at three categories of DIRECT COST (ACM may have to be run more than once to accomplish this.)

Use of CROS records from PDM and MASK record to crossover all instructional direct costs.

UPDT records for input to the Data Management Module

Use of CROS records and a MASK record to crossover noninstructional direct costs.

instructional salary (or compensation) accounts, such as History Department salaries, Chemistry Department salaries, or a single instructional salary account. Use of an ACM feature (the Mask feature) in this phase also crosses over all other direct-cost expenditures within an instructional unit in the same pattern as the related salary account. Thus, History Department expenditures for supplies and services, travel, telephone, and so forth will be crossed over through use of this feature.

Finally, in Phase 3 of the ACM runs, the noninstructional accounts are crossed over to the IEP activity structure using CROS crossover instructions and the Mask feature.

Some institutions may find that they have certain "pooled expenses" such as fringe benefits, a central telephone switchboard, or a central secretarial staff that are defined by IEP as direct costs within the organizational units "using" these services. Distributing these expenses over a number of organizational units is difficult in the ACM. The most efficient way to handle these expenses is often to just carry them over to the Data Management Module and then use one of the DMM features to allocate them throughout the appropriate IEP activity centers.

The ACM and NCHEMS U

The ACM features described above will now be used to crossover the NCHEMS U accounts described in Figure 6.

The data presented for NCHEMS U in Figure 6 and elsewhere in this manual indicate that the following adjustments should be made for NCHEMS U to adhere to the Information Exchange Procedures:

1. Adjust all capital expenditure accounts (those with an object code of '800') by crossing them over to activity center 9.2, Current Year's Capital Expenditures.
2. Adjust account 52-570 Computer Rental by crossing it over to activity center 9.5, Rental Expenditures-Equipment.
3. Adjust account 87-576 Building Rental by crossing it over to activity center 9.3, Rental Expenditures-Buildings and Land Improvements.
4. Adjust the computer chargeback account 21-560 Mathematics by reversing it to the academic computer center (departmental account 52).
5. Adjust account 63-465 food services purchases by crossing it over to activity center 9.1, Cost of Purchases for Resale.
6. Adjust the $300,000 in aid to students (account 68-421) to activity center 8.1, Scholarships. This will facilitate the crossover process in Phase 3.
7. Adjust the 63-302 building and grounds chargeback by reversing it from dormitories to buildings and grounds.
8. Distribute the $79,500 in fringe benefits that have been paid directly by the state.
9. Distribute the remainder of the institution's telephone expense to using departments. The total telephone expense is $193,000 (the sum of account 72-729 telephone nonexempt salaries and account 72-415 telephone company payments). Already charged back is $175,000, so the remaining $18,000 ($193,000 minus $175,000) must be distributed.
10. Adjust account 54-901 Interest on Buildings by crossing it over to activity center 9.4, Capital Cost of Buildings.
11. Adjust account 54-902 Interest on Equipment by crossing it over to activity center 9.6, Capital Cost of Equipment.

Because Figure 6 contains only a partial general ledger, it will be assumed that other organizational units have similar accounts that require adjustment. For example, organizational units other than Community Education are assumed to have building rental expenses under object code '576' and dormitories is not the only organizational unit that has received a chargeback from buildings and grounds (object code 302).

Phase 1--Adjustments

The Selective Crossover Record is useful in making Phase 1 adjustments. The SELR instructions to make the first seven adjustments described above are:

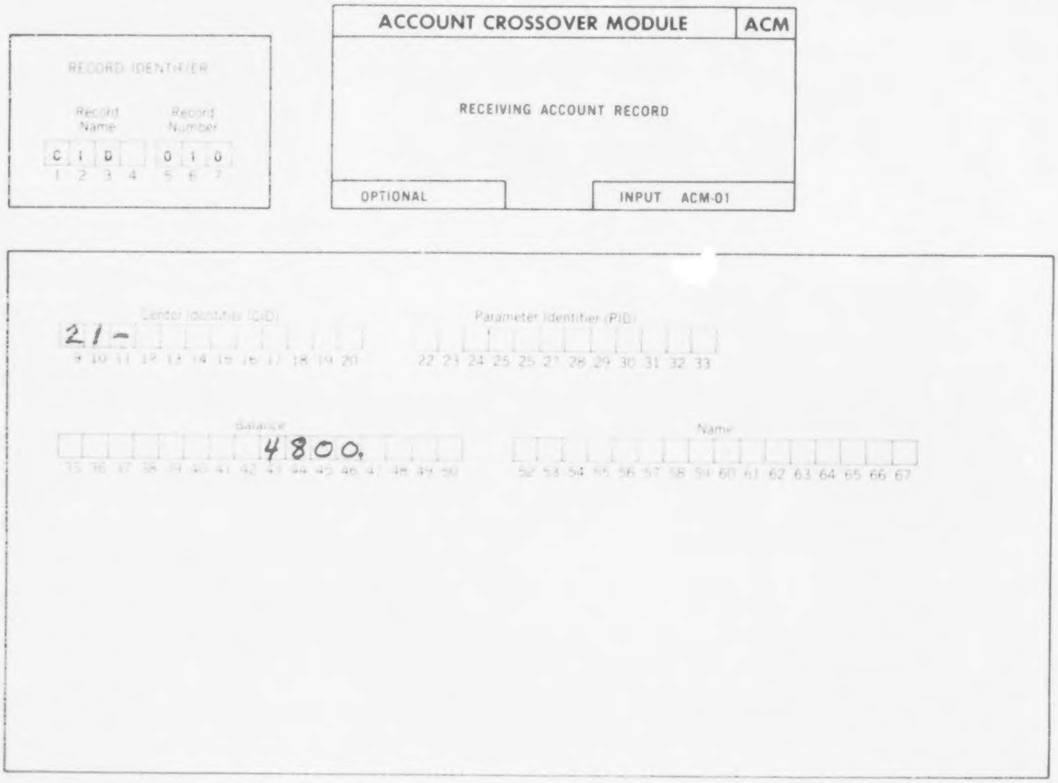
```
SELR012        800     9.2      DIRECT.COST
SELR012        570     9.5      DIRECT.COST
SELR012        576     9.3      DIRECT.COST
SELR012        560     52-300   DIRECT.COST
SELR012        465     9.1      DIRECT.COST
SELR012     68-421     8.1      DIRECT.COST
SELR012        302     54-300   DIRECT.COST
SELR012        901     9.4      DIRECT.COST
SELR012        902     9.6      DIRECT.COST
```

(The adjustment for item 8 is described below and the adjustment for item 9 will be done in the Data Management Module.)

The object codes on the SELR records are coded in the fourth through sixth positions of the sending account identifier. The crossover amount and the Dollar/Percent/Remainder are left blank to default to 100 percent.

The adjustments for the $79,500 in fringe benefit payments from the state involve distributing portions of this total amount to the institution's organizational units. Although there are a number of ways to do this, perhaps the easiest method--and one that can produce the most accurate results--is to calculate manually the amounts to be distributed to each organizational unit and then to append these values to the General Ledger File using the ACM Receiving Account Record. If it is determined, for example, that the NCHEMS U Mathematics discipline (accounting organizational unit '21') should receive $4,800 in fringe benefits, then the record shown in Figure 56 will include this amount in the General Ledger File.

Figure 56
Receiving Account Record



ACCOUNT CROSSOVER MODULE | ACM

RECEIVING ACCOUNT RECORD

OPTIONAL

INPUT ACM-01

RECORD IDENTIFIER

Record Name: CID

Record Number: 010

Center Identifier (CID): 21-

Parameter Identifier (PID):

Balance: 4800.

Name:

1 2 3 4 5 6 7
9 10 11 12 13 14 15 16 17 18 19 20
22 23 24 25 25 27 28 29 30 31 32 33
35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67

Note that an object code is not specified. An "artificial" code such as 'FRG' or '999' could be included but is unnecessary. The description of the Phase 2 run below will show why this is not required.

After this ACM run, the organizational unit accounts conform closely to the IEP definition of direct cost.

Phase 2--Instructional Accounts

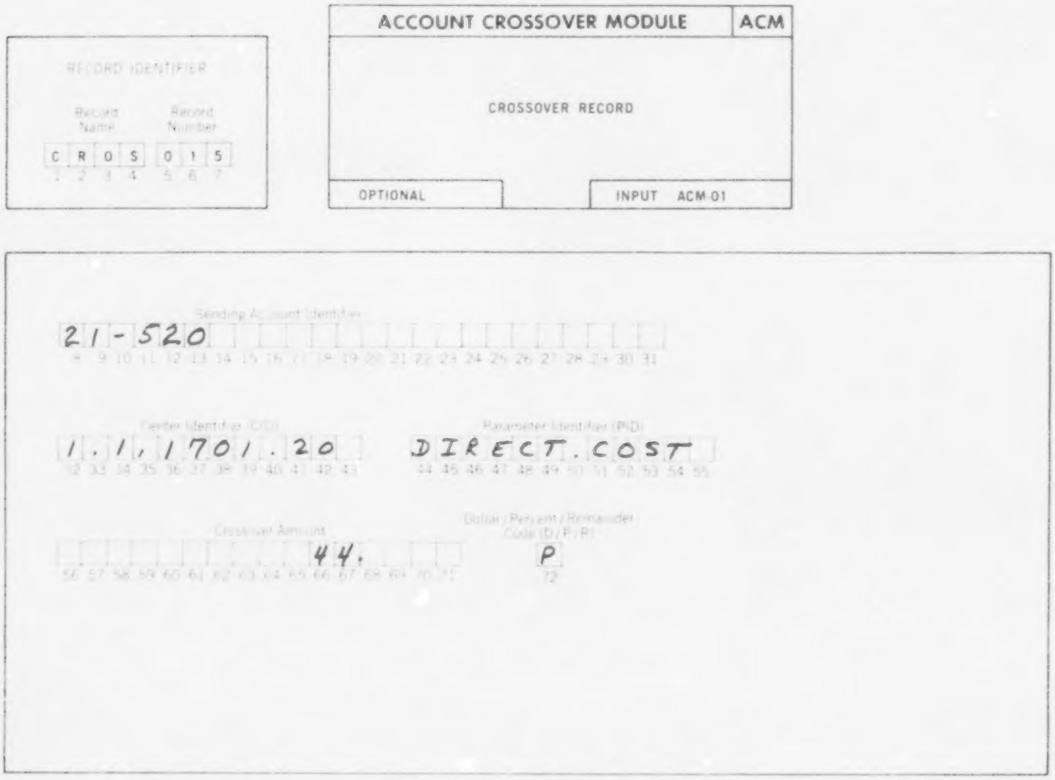
In the second ACM phase the instructional accounts are crossed over to the IEP activity structure. The Personnel Data Module has prepared most of the crossover instructions for this phase. Assume that PDM developed the following crossover instructions for the Mathematics salary account.

	Sending Account	Center Identifier	Amount	D/P/R
CROS015	21-520	1.1.1701.20	44%	P
CROS015	21-520	1.1.1701.30	38%	P
CROS015	21-520	1.1.1701.50	15%	P
CROS015	21-520	1.1.1901.30	3%	P

These four instructions and similar instructions for other instructional salary accounts will be used to cross over these accounts. Recall, however, that the Information Exchange Procedures specify that the other instructional direct cost expenses are to be crossed over in the same manner as the related salary accounts. In Phase 1 the instructional area accounts on the general ledger were adjusted to meet the IEP direct cost definition. The Mathematics Department accounts for telephone, travel, supplies, and so forth, should therefore be crossed over in the same pattern shown above. The use of the ACM Mask Record in conjunction with the CROS records produced by the PDM permits the object of expenditure code to be ignored and to crossover all Mathematics accounts in the same manner in which Mathematics salaries will be crossed over.

The mask to be used for NCHEMS U data is shown in Figure 54 on page 3.59. One of the Mathematics salary account CROS instructions is shown in Figure 57. The mask character of 'X' shown in the fourth through sixth positions of the mask pattern will effectively cause the object of expenditure code to be ignored, thereby causing 44 percent of each account with '21-' as the first three positions to be crossed over to the IEP activity center 1.1.1701.20, Lower Division Mathematics.

Figure 57
Crossover Record



RECORD IDENTIFIER

Record Name: C R O S (1 2 3 4)

Record Number: 0 1 5 (5 6 7)

ACCOUNT CROSSOVER MODULE — ACM

CROSSOVER RECORD

OPTIONAL

INPUT ACM-01

Sending Account Identifier (8–31): 21-520

Center Identifier (CID) (32–43): 1.1,1701.20

Parameter Identifier (PID) (44–55): DIRECT.COST

Crossover Amount (56–71): 44.

Dollar/Percent/Remainder Code (D/P/R) (72): P

Phase 3--Noninstructional Accounts

In the third phase of the ACM runs, the noninstructional accounts (organizational units) are crossed over to the IEP activity structure. As a result of the Phase 1 adjustments, the accounts relating to the noninstructional organizational units in NCHEMS U contain only the direct cost expenditures. A single CROS instruction can be prepared for each noninstructional organizational unit and the mask feature can be used to make the CROS instruction apply to all accounts related to the organizational unit. For example, using NCHEMS U data, the two instructions

```
MASK008       XXX
CROS015      50          4.1     DIRECT.COST
```

will cause the three library accounts (50-525, 50-529, and 50-584) to be crossed over to IEP activity center 4.1, Libraries. (The fourth library account shown in Figure 6, 50-800 Library Capital Expenditure, was crossed over to 9.2, Capital Expenditures, in the Phase 1 adjustments.)

Using this same approach for all NCHEMS U accounts permits all noninstructional units to be crossed over with the following instructions:

```
MASK008       XXX
CROS015      31          2.1     DIRECT.COST
CROS015      87          3.1     DIRECT.COST
CROS015      50          4.1     DIRECT.COST
CROS015      52          4.4     DIRECT.COST
CROS015      44          5.3     DIRECT.COST
CROS015      63          5.5     DIRECT.COST
CROS015      54          6.5     DIRECT.COST
CROS015      68          5.4     DIRECT.COST
CROS015      71          6.1     DIRECT.COST
CROS015      72    TELEPHONE     DIRECT.COST
CROS015      74          6.2     DIRECT.COST
```

Note that central telephone expenses are crossed over to an intermediate activity center 'TELEPHONE'. These expenses are part of direct costs and will be allocated in the Data Management Module to the IEP activity centers (see page 3.87).

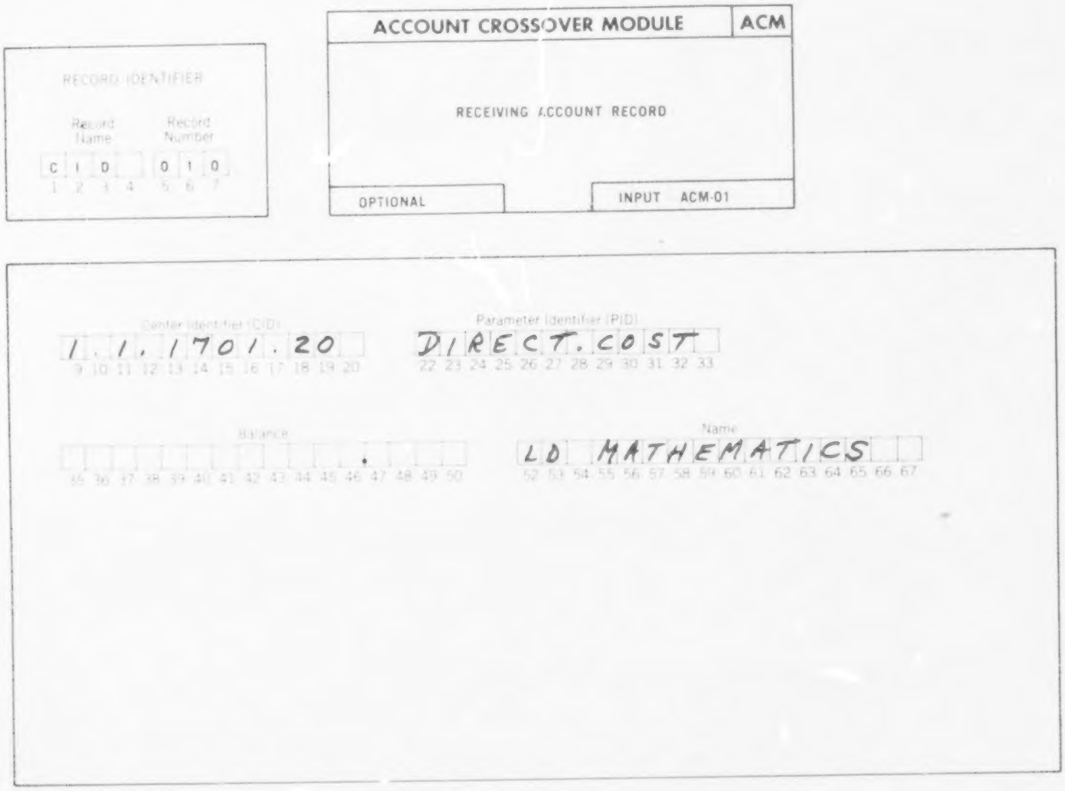
In the crossover instructions above, the Dollar/Percent/Remainder field and the amount field were left blank so the ACM default of 100 percent will be used. If institutional analysis determines that an organizational unit actually performs functions described in more than one IEP activity center, multiple CROS records may be used to describe this division. At NCHEMS U, for example, it may be determined that 10 percent of the effort of the financial aids office is actually spent in attempting to find jobs for students--a placement function. Because placement activities are included in IEP activity center 5.3, Counseling and Career Guidance, 10 percent of the expenditure in the financial aids office should be crossed over to 5.3. To accomplish this, the single CROS instruction for organizational unit '68' above would be replaced with the two instructions:

```
CROS015     68     5.4     DIRECT COST     90     P
CORS015     68     5.3     DIRECT.COST     10     P
```

<u>IEP Activity Center Names</u>

When institutional account balances are first provided on general ledger records, the account name may optionally be supplied to improve the readability of reports produced by ACM. For example, the name 'ENGLISH SALARIES' may have been supplied with account 10-520 and will appear along with the account number. However, the crossover process introduces new "account identifiers" (such as 1.1.1701.20) that are part of the IEP activity structure. Unless supplied with the names of these new account identifiers, ACM will not be able to print the more readily understandable 'LD MATHEMATICS' along with the 1.1.1701.20 account identifier. The Receiving Account Record shown in Figure 58 permits these names to be introduced to ACM. Figure 58 illustrates how to supply a name for Lower Division Mathematics. (Any value in the balance field is added to the expenditure balance for the Center Identifier. When using the Receiving Account Record to supply activity center names, the balance field should be left blank so the account balance will be unchanged.)

Figure 58
Receiving Account Record



RECORD IDENTIFIER

Record Name: CID
Record Number: 010

ACCOUNT CROSSOVER MODULE | ACM

RECEIVING ACCOUNT RECORD

OPTIONAL

INPUT ACM-01

Center Identifier (CID): 1.1.1701.20

Parameter Identifier (PID): DIRECT.COST

Balance: .

Name: LD MATHEMATICS

Another ACM option (the DMM Name Updates field on the ACM2 Control Record) permits ACM to pass these IEP activity center names to the Data Management Module for use in DMM reports also.

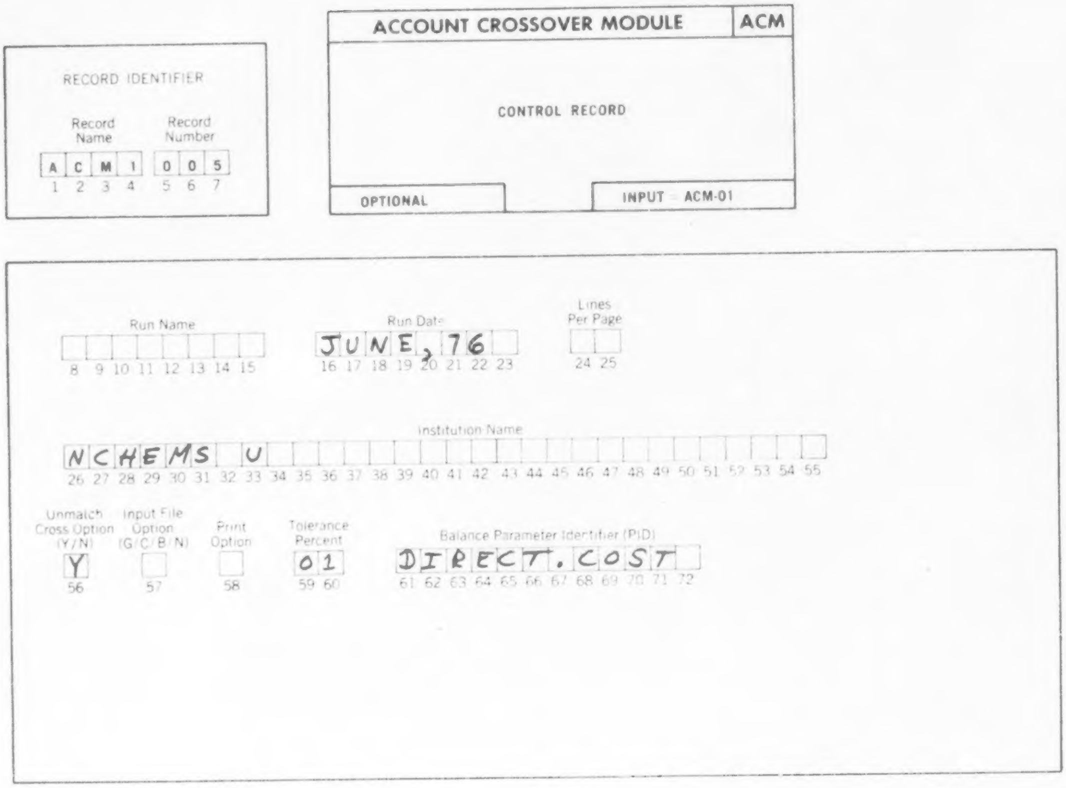
Receiving Account Records may be supplied as input to ACM in any run.

ACM CONTROL RECORD

The ACM1 Control Record is shown in Figure 59. Two fields on this record are particularly useful. For IEP purposes the Unmatch Cross Option field should be coded 'Y' to "pass through" to the new general ledger all accounts not explicitly processed by a crossover instruction. This results in all dollars being retained in the analysis, reduces the chance of introducing errors, and facilitates reconciliation with other financial records.

The Tolerance Percent field permits specifying a percentage that is used to determine if the sum of the crossover percentages for each account is within a specified range. In Figure 59, a tolerance percentage of one percent is specified. If an account's total crossover percentages are outside the range 99-101 percent, an informational message will be printed to warn of the possible error.

Figure 59
ACM1 Control Record



RECORD IDENTIFIER

Record Name (1–4): A C M 1
Record Number (5–7): 0 0 5

ACCOUNT CROSSOVER MODULE | **ACM**

CONTROL RECORD

OPTIONAL

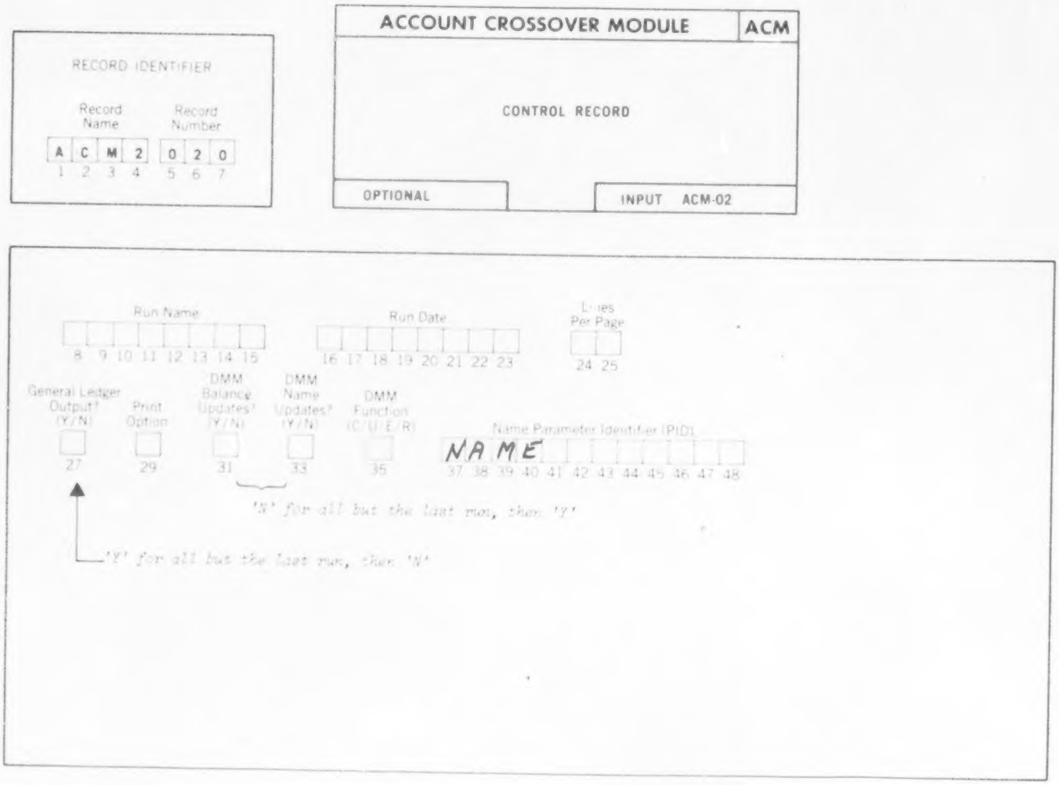
INPUT = ACM-01

Run Name (8–15):
Run Date (16–23): JUNE, 76
Lines Per Page (24–25):
Institution Name (26–55): NCHEMS U
Unmatch Cross Option (Y/N) (56): Y
Input File Option (G/C/B/N) (57):
Print Option (58):
Tolerance Percent (59–60): 01
Balance Parameter Identifier (PID) (61–72): DIRECT.COST

ACM2 Control Record

The several runs of the ACM described above have applied crossover instructions to an existing general ledger and have created a new or modified general ledger, which will then be used as the input to the next ACM run. The final ACM run should produce input records for use by the Data Management Module rather than another general ledger file. The ACM2 Control Record shown in Figure 60 is used to specify which type of output is desired.

Figure 60
ACM2 Control Record


RECORD IDENTIFIER
Record Name
Record Number
A C M 2
0 2 0
1 2 3 4 5 6 7
ACCOUNT CROSSOVER MODULE
ACM
CONTROL RECORD
OPTIONAL
INPUT ACM-02
Run Name
8 9 10 11 12 13 14 15
Run Date
16 17 18 19 20 21 22 23
Lines Per Page
24 25
General Ledger Output? (Y/N)
27
Print Option
29
DMM Balance Updates? (Y/N)
31
DMM Name Updates? (Y/N)
33
DMM Function (C/U/E/R)
35
Name Parameter Identifier (PID)
NAME
37 38 39 40 41 42 43 44 45 46 47 48

'N' for all but the last run, then 'Y'

'Y' for all but the last run, then 'N'

This control record also permits the user to specify the Name Parameter Identifier that will be used for IEP activity center names that have been supplied via the Receiving Account Record.

EXAMPLE OF ACM DATA

Figure 61 summarizes the control records and other ACM input for each of the three phases described in this section.

```
00000000011111111112222222222333333333344444444445555555555666666666677777777778
12345678901234567890123456789012345678901234567890123456789012345678901234567890

10-520                         43000    ENGL SALARY
10-523                          8000    ENGL SECT
10-580                          3000    ENGL TELE CHBK
10-581                          1000    ENGL TRAVEL
10-584                          5000    ENGL SUPPLIES

72-529                         53000    TELE NONEXEMPT
74-525                         40000    CONTROLLERS SALR

ACM1005PHASE 1 JUNE,76   N C H E M S  U                YB0 1
SELR012   800                  9.2         DIRECT.COST          100    P
SELR012   570                  9.4         DIRECT.COST          100    P
SELR012   576                  9.3         DIRECT.COST          100    P
SELR012   560                  52-300      DIRECT.COST          100    P
SELR012   465                  9.1         DIRECT.COST          100    P
SELR01268-421                  8.1         DIRECT.COST          100    P
SELR01263-460                  6.5         DIRECT.COST          100    P
SELR01263-455                  6.5         DIRECT.COST          100    P
SELR012   302                  54-300      DIRECT.COST          100    P
CID 010 10-FRG       DIRECT.COST          6000     FRINGES
CID 010 18-FRG       DIRECT.COST          3000     FRINGES

CID 010 50-FRG       DIRECT.COST         10000     FRINGES
CID 010 54-FRG       DIRECT.COST         14000     FRINGES

ACM2020PHASE 1 JUNE,76    Y 0 N N

ACM1005PHASE 2 JUNE,76   N C H E M S  U                YB0 1DIRECT.COST

ACM2020PHASE 2 JUNE,76    Y 0 N N

ACM1005PHASE 3 JUNE,76   N C H E M S  U                YB0 1DIRECT.COST
MASK008   XXXX      XXXXXXXXXXXX
CROS01531                      2.1         DIRECT.COST          100    P
CROS01587                      1.3         DIRECT.COST          100    P
CROS01550                      4.1         DIRECT.COST          100    P
CROS01552                      4.4         DIRECT.COST          100    P
CROS01544                      5.3         DIRECT.COST          100    P
CROS01563                      5.5         DIRECT.COST          100    P
CROS01554                      6.5         DIRECT.COST          100    P
CROS01568                      5.4         DIRECT.COST          100    P
CROS01571                      6.1         DIRECT.COST          100    P
CROS01574                      6.2         DIRECT.COST          100    P
CROS01572                      TELEPHONE   DIRECT.COST          100    P
CID 010 1.1.1501.20  DIRECT.COST                   LD ENGLISH
CID 010 1.1.1501.20  DIRECT.COST                   LD ENGLISH

CID 010 9.3          DIRECT.COST                   CAP COST/BLDGS
CID 010 9.4          DIRECT.COST                   CAP COST/EQUIP

ACM2020PHASE 3 JUNE,76    Y 0 Y N
```

General ledger records.

1. *Control record for ACM1.*
2. *SELR records for direct cost adjustments.*
3. *CID records to enter manually calculated fringe benefits.*

ACM Phase 1

Control record for ACM2

NOTE: Crossover records from PDM are processed in this phase.

ACM Phase 2

ACM Phase 3

Supply CID names for use in DMM.

Figure 61 Sample ACM Input

ACM REPORTS

Figures 62 and 63 illustrate the Contribution and Consumption Reports produced by the Account Crossover Module.

The Contribution Report shows each sending account and the receiving accounts to which the sending accounts are crossed over. Simplified somewhat, this report shows institutional accounts and the IEP activity centers to which the institutional accounts are crossed over.

The Consumption Report shows (again simplified) each activity center and the institutional accounts from which the activity center consumed resources.

Figure 62
ACM Contribution Report

```
ACM-01                                      N   C   H   E   M   S    U                                PAGE   2
PHASE 3                                     CONTRIBUTION REPORT                                       JUNE.76

SENDING ACCOUNT                          RECEIVING ACCOUNT                G.L. BALANCE           AMT. CROSSED  PERCENT

1.1.0401.20 DIRECT.COST  LD BIOL - ALL   1.1.0401.20 DIRECT.COST           19,059.0000           19,059.0000 100.0000

1.1.0401.30 DIRECT.COST  UD BIOL - ALL   1.1.0401.30 DIRECT.COST           45,322.0000           45,322.0000 100.0000

1.1.4999.20 DIRECT.COST  LD OTHR - ALL   1.1.4999.20 DIRECT.COST           45,252.0000           45,252.0000 100.0000

1.1.4999.30 DIRECT.COST  UD OTHR - ALL   1.1.4999.30 DIRECT.COST           60,690.0000           60,690.0000 100.0000

10                       FRINGES         1.1.1501.30 DIRECT.COST           66,000.0000           28,514.9700  43.2045
                                         1.1.1501.20 DIRECT.COST                                 37,484.9640  56.7954
                                         * TOTAL *                                               65,999.9340  99.9999

18                       FRINGES         1.1.1905.20 DIRECT.COST           54,450.0000           26,253.8843  48.2165
                                         1.1.1701.30 DIRECT.COST                                  5,023.0670   9.2251
                                         4.6.1905    DIRECT.COST                                  4,051.9512   7.4416
                                         2.2.1905    DIRECT.COST                                  3,767.2866   6.9188
                                         1.1.1905.30 DIRECT.COST                                 15,353.8110  28.1980
                                         * TOTAL *                                               54,450.0001 100.0000

21                       FRINGES         1.1.1701.20 DIRECT.COST           57,000.0000           34,292.6820  60.1626
                                         1.1.1905.30 DIRECT.COST                                  2,780.4600   4.8780
                                         1.1.1701.30 DIRECT.COST                                 19,926.8010  34.9593
                                         * TOTAL *                                               56,999.9430  99.9999

31                       FRINGES         2.1         DIRECT.COST           56,800.0000           56,800.0000 100.0000

44                       FRINGES         5.3         DIRECT.COST           71,400.0000           71,400.0000 100.0000

50                       FRINGES         4.1         DIRECT.COST          102,000.0000          102,000.0000 100.0000

52                       FRINGES         4.4         DIRECT.COST          102,000.0000          102,000.0000 100.0000

54                       FRINGES         6.5         DIRECT.COST          315,000.0000          315,000.0000 100.0000

6.5         DIRECT.COST                  6.5         DIRECT.COST          130,000.0000          130,000.0000 100.0000

63                       FRINGES         5.5         DIRECT.COST          108,000.0000          108,000.0000 100.0000

68                       FRINGES         5.4         DIRECT.COST           27,500.0000           27,500.0000 100.0000

71                       FRINGES         6.1         DIRECT.COST           29,000.0000           29,000.0000 100.0000

72                       FRINGES         TELEPHONE   DIRECT.COST           23,500.0000           23,500.0000 100.0000

74                       FRINGES         6.2         DIRECT.COST           46,000.0000           46,000.0000 100.0000

8.1         DIRECT.COST                  8.1         DIRECT.COST          300,000.0000          300,000.0000 100.0000

87                       FRINGES         1.3         DIRECT.COST           16,300.0000           16,300.0000 100.0000

                                                                          100,000.0000          100,000.0000 100.0000
```

The crossover instruction from PDM and the MASK instruction caused the $54,450 in the Chemistry department accounts to be crossed over in this pattern.

Figure 63

ACM Consumption Report

```
ACM-02                                   N   C   H   E   M   S     U                                    PAGE    3
PHASE 3                                      CONSUMPTION REPORT                                         JUNE,76

RECEIVING ACCOUNT                      SENDING ACCOUNT                                        AMT. CROSSED

4.1        DIRECT.COST  LIBRARIES                                    * ESTABLISH *                       .0000
                                       50                            FRINGES                    102,000.0000
                                       * TOTAL*                                                 102,000.0000

4.4        DIRECT.COST  ACAD COMPUTING                               * ESTABLISH *                       .0000
                                       52                            FRINGES                    102,000.0000
                                       * TOTAL*                                                 102,000.0000

4.6.1905   DIRECT.COST                 18                            FRINGES                      4,051.9512

5.3        DIRECT.COST  COUNSELING                                   * ESTABLISH *                       .0000
                                       44                            FRINGES                     71,400.0000
                                       * TOTAL*                                                  71,400.0000

5.4        DIRECT.COST  FIN AID ADMIN                                * ESTABLISH *                       .0000
                                       68                            FRINGES                     27,500.0000
                                       * TOTAL*                                                  27,500.0000

5.5        DIRECT.COST  STUDENT AUX SERV                             * ESTABLISH *                       .0000
                                       63                            FRINGES                    108,000.0000
                                       * TOTAL*                                                 108,000.0000

6.1        DIRECT.COST  EXEC MGMT                                    * ESTABLISH *                       .0000
                                       71                            FRINGES                     29,000.0000
                                       * TOTAL*                                                  29,000.0000

6.2        DIRECT.COST  FISCAL OPERATION                             * ESTABLISH *                       .0000
                                       74                            FRINGES                     46,000.0000
                                       * TOTAL*                                                  46,000.0000

6.5        DIRECT.COST  PHYSICAL PLANT                               * ESTABLISH *                       .0000
                                       54                            FRINGES                    315,000.0000
                                       6.5        DIRECT.COST                                   130,000.0000
                                       * TOTAL*                                                 445,000.0000

8.1        DIRECT.COST  SCHOLARSHIPS                                 * ESTABLISH *                       .0000
                                       8.1        DIRECT.COST                                   300,000.0000
                                       * TOTAL*                                                 300,000.0000

9.1        DIRECT.COST  COST OF PURCHASE                             * ESTABLISH *                       .0000
                                       9.1        DIRECT.COST                                   100,000.0000
                                       * TOTAL*                                                 100,000.0000

9.2        DIRECT.COST  CAP EXPEND                                   * ESTABLISH *                       .0000
                                       9.2        DIRECT.COST                                    73,000.0000
                                       * TOTAL*                                                  73,000.0000

9.3        DIRECT.COST  CAP COST/BLDGS                               * ESTABLISH *                       .0000
                                       9.3        DIRECT.COST                                     4,000.0000
                                       * TOTAL*                                                   4,000.0000
```

3.77

DATA MANAGEMENT MODULE

DATA MANAGEMENT MODULE (DMM)

OVERVIEW

The Data Management Module (DMM) is a flexible software module that performs many of the calculations required in the IEP implementation process. The DMM assists in the IEP implementation Steps 4 through 8. Because the module supports more complicated analysis than is required in IEP, many of the features provided by the module are not needed in a "basic" IEP implementation. The module also provides many default values for control card fields and, if properly understood, these defaults can greatly reduce the number of control cards that must be supplied by the user.

Most of the required input for the Data Management Module is prepared by the Student Data Module, the Personnel Data Module, and the Account Crossover Module. Data from these modules are maintained in a DMM "matrix" such as that illustrated in Figure 64. The rows of the DMM matrix represent activity centers and the columns represent parameters, measures, or attributes associated with the activity centers. An element of the matrix is the value for a measure for an activity center (for example, 1,698 credit hours in Lower Division English in Figure 64). The seven DMM programs are simply a means of maintaining data in a matrix, operating on those data, "updating" the matrix to include results of calculations, and displaying data. In general, several of these programs are used in combination to carry out some particular calculation or to update the DMM matrix of data. Understanding the use of these programs is important in understanding the entire DMM process. The functions shown in Figure 65 are performed by the DMM programs indicated.

Figure 64

DMM Matrix

Activity Center	Name	Credit. Hours	Direct. Cost	Dir. Cost/Cr	Allocat. Cost	Full. Cost	Full. Cost/Cr	Enroll. Head	Enroll. Full	Enroll. Part	Enroll. FTE	IWL. 1501.20
	Parameter											
1.1.1501.20	LD English	1,698	38,137	22.46	87,339	125,468	73.90					429
1.1.1501.30	UD English	919	29,011	31.57	63,841	92,853	101.04					137
1.1.1701.20	LD Math	1,584	59,556	37.60	128,949	188,505	119.04					207
1.1.1701.30	UD Math	738	43,467	58.90	91.200	134,667	182.47					10
1.3	Comm. Educ.		16,600		32,832	49,432						
2.1	Research Center		57,800		13,156	70,956						
4.1	Libraries		103,800		−103,800							
4.4	Computing Support		103,800		−103,800							
4.6.1905	Acad. Admin.		7,100		−7,100							
5.3	Counseling/Career		72,600		−72,600							
5.4	Fin. Aid—Admin.		28,000		−28,000							
5.5	St. Aux. Services		109,900		170,607	280,507						
6.1	Exec. Mgmt.		29,500		−29.500							
6.2	Fiscal Operations		46,800		−46,800							
6.5	Phy. Plant Oper.		452,700		−452,700							
8.1	Scholarships		300,00			300,000						
9.1	Cost of Purchases		100,00			100,000						
9.2	Cap. Expenditures		73,000			73,000						
9.3-9.4	Cap. Cost—Bldgs.		324,000		−324,000							
9.5-9.6	Cap. Cost—Equip.		98,100		−98,100							
Prg. 1501.20	LD English	1,724	42,215	24.49		137,809	79.94	55	47	8	47.8	
Prg. 1501.30	UD English	1,950	54,613	28.00		176,327	90.42	75	50	25	54.2	
Prg. 2001.20	LD Psychology	1,252	33,749	26.96		109,293	87.29	43	34	9	37.8	
Prg. 2001.30	UD Psychology	1,150	37,054	32.22		118,429	102.98	34	32	2	31.9	

3.81

Figure 65
DMM Program Functions

Program(s)	Function
1	Update the DMM matrix
2	Display data from the matrix
3	Perform arithmetic calculations using data in the matrix
4 and 5	Allocate or distribute values across a number of activity centers represented in the matrix
6 and 7	Calculate discipline and student program unit costs.

The calculation of values in programs 3, 4 and 5, or 6 and 7 does not automatically include the results of the calculations in the matrix. For example, the use of DMM program 3 to calculate a faculty productivity ratio (by dividing service-months of effort into student credit hours taught for each discipline) does not incorporate the calculated values into the matrix for subsequent displays or analysis. Program 1 must therefore be used to make these values a "permanent" part of the matrix.

THE DMM STEPS

Because of the different nature of the DMM programs (as described above), an approach to running the DMM programs must be developed. Figure 66 describes eight DMM steps that will be used to illustrate DMM, using NCHEMS U data. These eight steps can be used by most institutions to perform required DMM processing. However, the way in which the data from SDM, PDM, and ACM are passed to DMM depends on the needs of the particular study, and each user should determine the approach to be used in a particular study. Hence, Figure 66 should be used as a guideline, and changes should be made where necessary.

Figure 66
DMM Step Summary

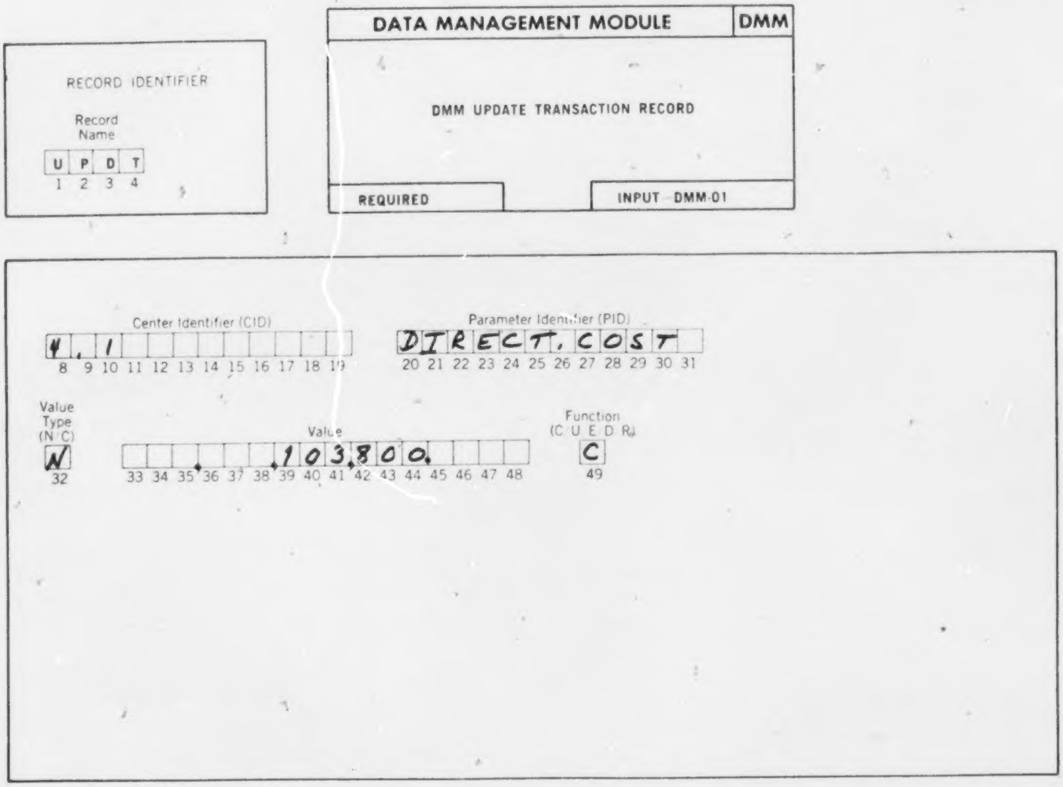
DMM STEP NUMBER	DMM PROGRAM(S)	DESCRIPTION
1	1	Generate initial DMM file. Will include UPDT records produced by SDM, PDM, and ACM.
2	2	Display complete file to view data problems.
3	4,5,1	Perform any necessary "front end allocations" to allocate pooled expenses such as central telephone and fringe benefits or the allocation of an expense in a discipline to the several course levels within the discipline.
4	6,7,1	Calculate discipline and program direct unit costs.
5	4,5,1	Allocate support cost centers to final cost objectives.
6	3,1	Add allocated costs calculated in Step 5 to direct cost totals for all final cost objectives to produce full cost values for each IEP final cost objective.
7	6,7,1	Calculate discipline and program full unit costs.
8	2	Display selected data contained on file.

DMM Step 1--Generate Initial DMM File

In this step, results from the Student Data Module, Personnel Data Module, and the Account Crossover Module are used to produce the initial DMM matrix.

Describing the manner in which these results (and results from other DMM programs) are passed to DMM Program 1 may be useful in understanding the DMM matrix and its updating. All updates to the matrix are entered in the form of the DMM Update Transaction Record shown in Figure 67. The Center Identifier specifies a row in the matrix and the Parameter Identifier specifies a column. Together, these two identifiers specify a particular element within the DMM matrix. The Value field indicates the value that is to be used in the specified element (row and column) of the matrix.

Figure 67
DMM Update Record



RECORD IDENTIFIER

Record Name: U P D T (1 2 3 4)

DATA MANAGEMENT MODULE | DMM

DMM UPDATE TRANSACTION RECORD

REQUIRED

INPUT DMM-01

Center Identifier (CID) (8–19): 4.1

Parameter Identifier (PID) (20–31): DIRECT.COST

Value Type (N C) (32): N

Value (33–48): 103,800.

Function (C U E D R) (49): C

(Because the user will not typically be preparing these records manually, the more complicated use of the Value Type and Function fields is not described in detail here. Interested users may refer to the NCHEMS Costing and Data Management System technical documentation for more information.)

The example in Figure 67 illustrates the direct cost (including fringe benefits) that would have been calculated by the ACM for NCHEMS U's 4.1, Library, expenditures.

The only control card for this first step is the DMM1 Control Record shown in Figure 68. The use of this record associates the institution name and the run date with the DMM matrix.

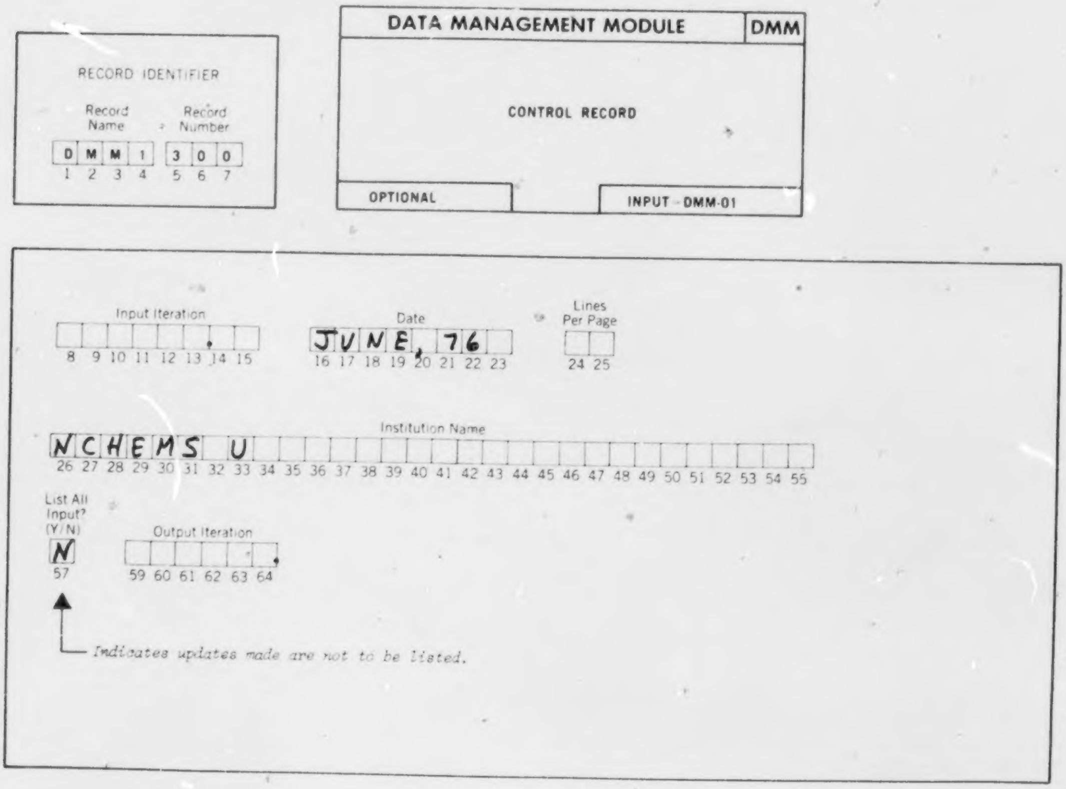


Figure 68
DMM1 Control Record

RECORD IDENTIFIER
Record Name: DMM1 (1 2 3 4)
Record Number: 300 (5 6 7)

DATA MANAGEMENT MODULE — DMM
CONTROL RECORD
OPTIONAL
INPUT - DMM-01

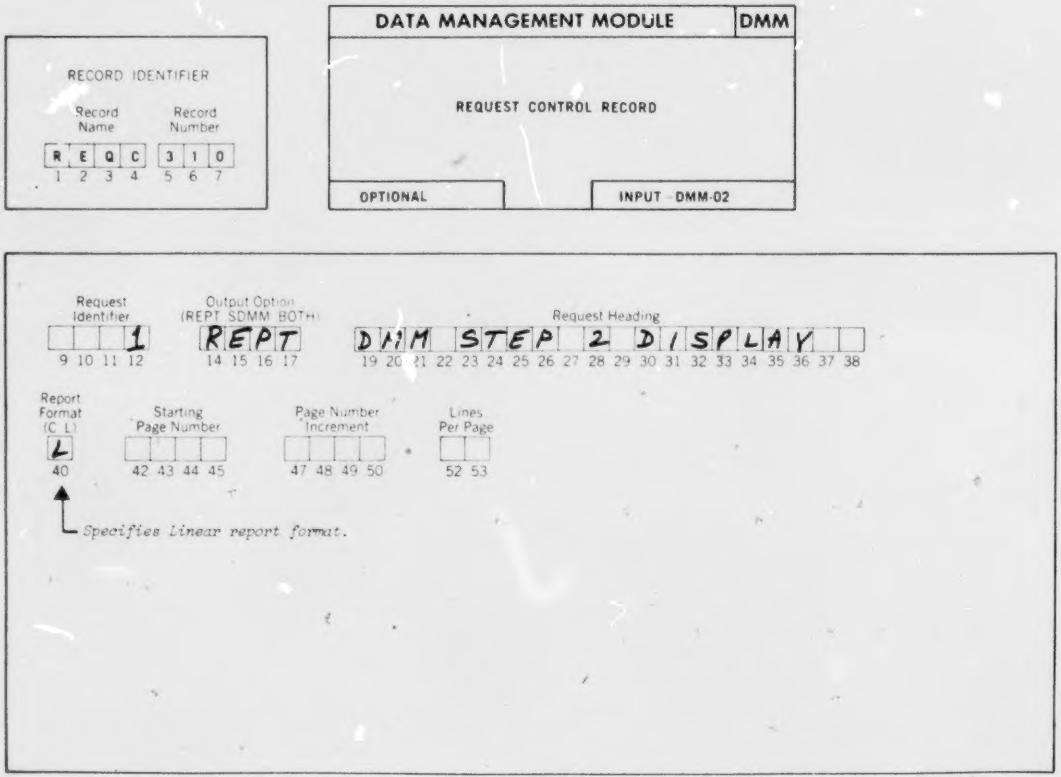
Input Iteration (8–15):
Date (16–23): JUNE, 76
Lines Per Page (24 25):
Institution Name (26–55): NCHEMS U
List All Input? (Y/N) (57): N
Output Iteration (59–64):

Indicates updates made are not to be listed.

DMM Step 2--Display Complete DMM File

The second DMM step is to use Program 2 to produce a complete listing of the data in the DMM matrix. Figure 69 shows the DMM Request Control Record.

Figure 69
Request Control Record



RECORD IDENTIFIER

Record Name: R E Q C (1 2 3 4)

Record Number: 3 1 0 (5 6 7)

DATA MANAGEMENT MODULE | **DMM**

REQUEST CONTROL RECORD

OPTIONAL

INPUT DMM-02

Request Identifier (9 10 11 12): 1

Output Option (REPT SDMM BOTH) (14 15 16 17): REPT

Request Heading (19–38): DMM STEP 2 DISPLAY

Report Format (C L) (40): L

Starting Page Number (42 43 44 45):

Page Number Increment (47 48 49 50):

Lines Per Page (52 53):

Specifies Linear report format.

Figure 70 illustrates the two report formats that are available in the DMM display function. The linear format displays all parameter values for an activity center, with each value printed on a separate line. The columnar format permits displaying up to five parameter values on a single line. For this DMM step the linear format should be used. This report can be examined to determine that all parameters and values expected from SDM, PDM, and ACM have, in fact, been provided to the Data Management Module.

Figure 70
DMM Report Formats

```
1.1.1501.20                   CREDIT.HOURS                           1,698.0000
                              DIRECT.COST                           37,484.9640
                              IWL.0414.20                              385.0000
                              IWL.0414.30                               80.0000
                              IWL.1501.20                              429.0000
                              IWL.1501.30                              115.0000
                              IWL.2001.20                              356.0000
                              IWL.2001.30                               63.0000
                              IWL.4999.20                              207.0000
                              IWL.4999.30                               63.0000
                              NAME                             LD ENGLISH
                              PERSON.UNITS                              30.0000
1.1.1501.30                   CREDIT.HOURS                             919.0000
                              DIRECT.COST                           28,514.9700
                              IWL.0414.20                               43.0000
                              IWL.0414.30                               10.0000
                              IWL.1501.20                              137.0000
                              IWL.1501.30                              480.0000
                              IWL.2001.20                               36.0000
                              IWL.2001.30                              130.0000
                              IWL.4999.20                               31.0000
                              IWL.4999.30                               52.0000
                              NAME                             UD ENGLISH
                              PERSON.UNITS                              20.0000
```

Linear Format (all parameters values shown for each activity center)

```
DMM-02                                     N  C  H  E  M  S  U
000007.00

                 **************************  P A R A M E T E R   I D E N T I F I E R S   *******
CENTER IDENT.         NAME                  PERSON.UNITS         DIRECT.COST            ALLOCAT.COST

1.1.0401.20           LD BIOLOGY                 20.0000         19,390.3336           43,498.2553
1.1.0401.30           UD BIOLOGY                 50.0000         46,109.9033          100,621.5710
1.1.1501.20           LD ENGLISH                 30.0000         38,136.6237           87,338.5702
1.1.1501.30           UD ENGLISH                 20.0000         29,010.6908           63,841.0489
1.1.1701.20           LD MATH                    25.3300         59,555.5165          128,948.8490
1.1.1701.30           UD MATH                    16.3400         43,466.9399           91,199.8173
1.1.1905.20           LD CHEMISTRY               10.0000         46,310.2966          100,202.7375
1.1.1905.30           UD CHEMISTRY                7.4200         31,912.0282           68,741.6287
1.1.4999.20           LD ALL OTHER               20.0000         46,038.6860          108,670.8747
1.1.4999.30           UD ALL OTHER               20.0000         61,745.0701          142,387.2298
** SUB-TOTAL **                                 214.0900        421,676.0887          935,450.5824

1.3                   COMMUNITY ED                               16,583.3677           32,831.6281
** SUB-TOTAL **                                                  16,583.3677           32,831.6281

2.1                   RESEARCH CENTER                            57,787.4442          114,407.1608
** SUB-TOTAL **                                                  57,787.4442          114,407.1608

2.1.1905              CHEM RESEARCH
2.2.1905                                          1.2500          6,645.2788           13,156.2806
** SUB-TOTAL **                                   1.2500          6,645.2788           13,156.2806

4.1                   LIBRARIES                                 103,773.2278         -103,773.2278
** SUB-TOTAL **                                                 103,773.2278         -103,773.2278
```

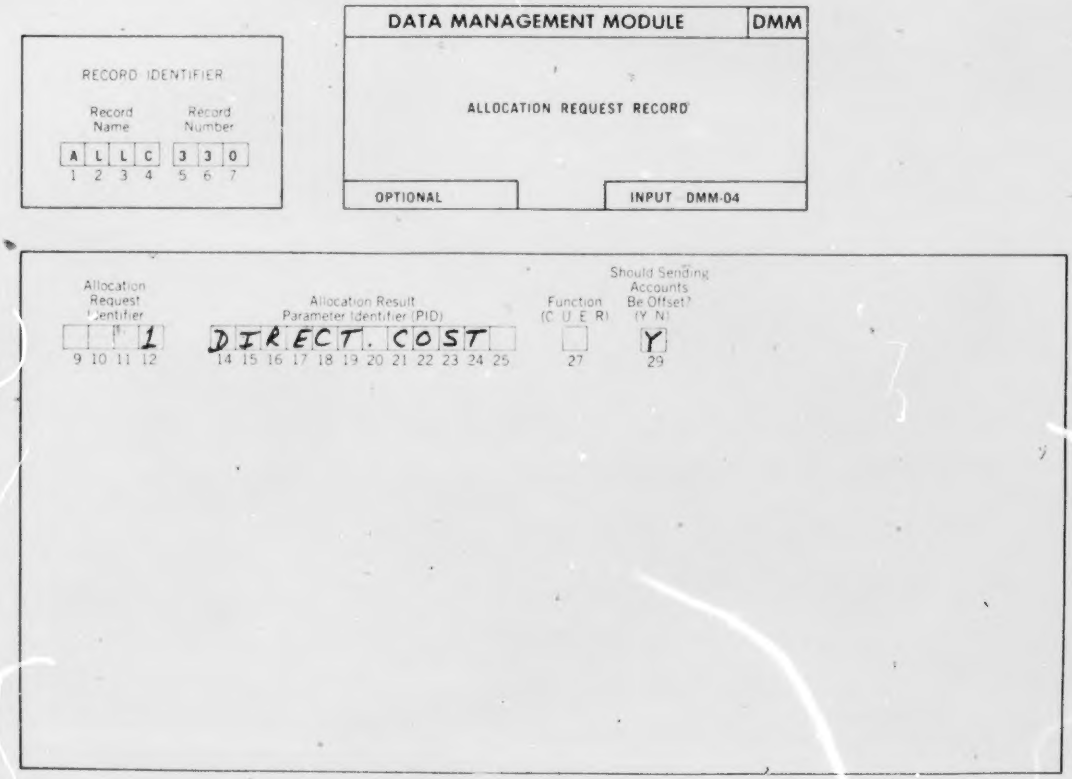
Columnar Format (up to five parameter values shown on one line for an activity center).

It also may be useful at this point to print selected data from the DMM matrix in a columnar report format. This format, which permits data totals to be produced, may be used in preliminary manual editing of the data to check further their accuracy and completeness. The control cards required to request columnar DMM reports are described in DMM Step 8.

DMM Step 3--Perform "Front End Allocation"

Many institutions will complete their ACM processing with one or more categories of "pooled expenses" that must be allocated to IEP activity centers and included in direct costs. For NCHEMS U, the intermediate activity center 'TELEPHONE' must be distributed in this step. Each allocation involves the use of the four Allocation Records shown in Figures 71 through 74.

Figure 71
Allocation Request Record



RECORD IDENTIFIER

Record Name				Record Number		
A	L	L	C	3	3	0
1	2	3	4	5	6	7

DATA MANAGEMENT MODULE — DMM

ALLOCATION REQUEST RECORD

OPTIONAL

INPUT DMM-04

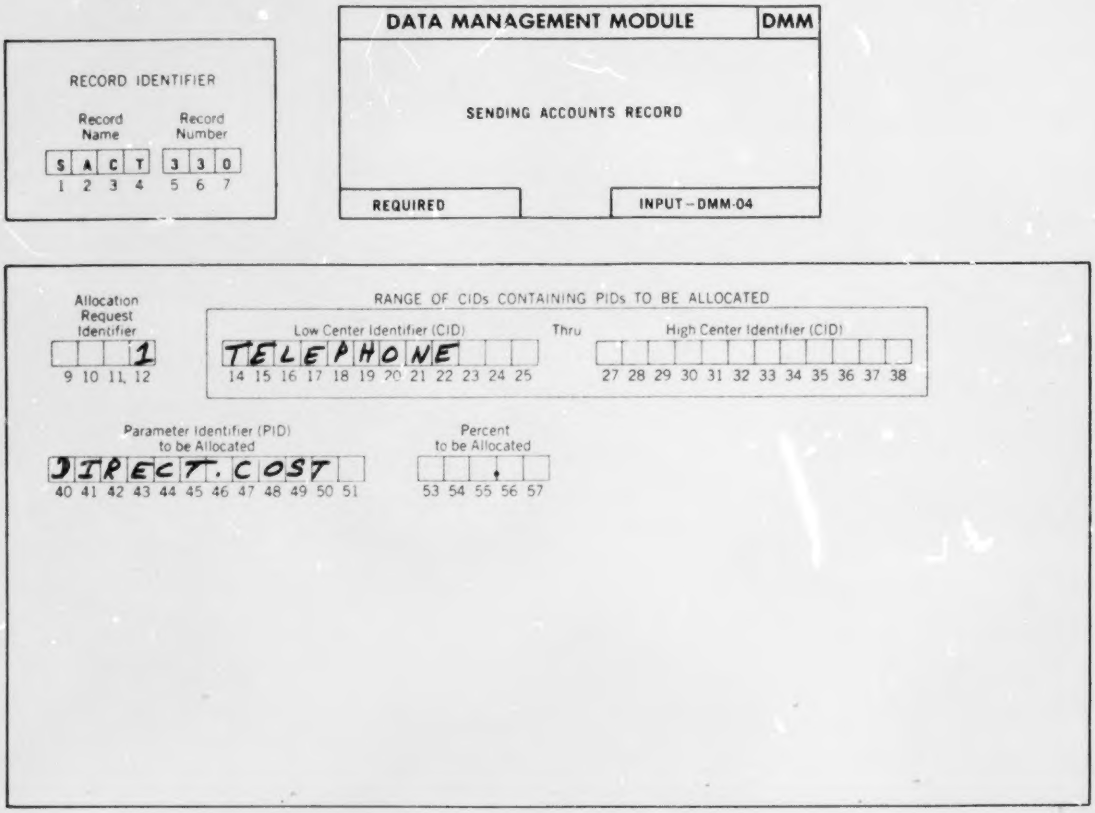
Allocation Request Identifier (9-12): 1

Allocation Result Parameter Identifier (PID) (14-25): DIRECT.COST

Function (C U E R) (27):

Should Sending Accounts Be Offset? (Y N) (29): Y

Figure 72
Sending Accounts Record



RECORD IDENTIFIER

Record Name: S A C T (1 2 3 4)
Record Number: 3 3 0 (5 6 7)

DATA MANAGEMENT MODULE | **DMM**

SENDING ACCOUNTS RECORD

REQUIRED | INPUT – DMM-04

Allocation Request Identifier (9 10 11 12): 1

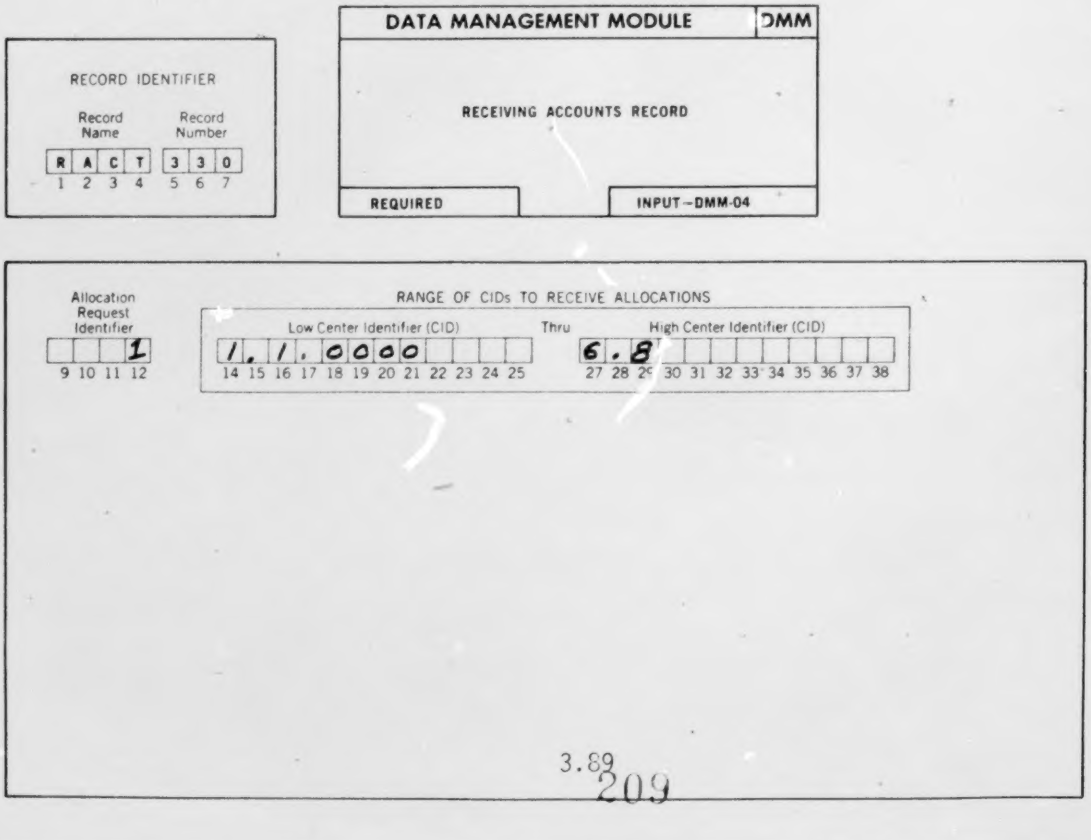
RANGE OF CIDs CONTAINING PIDs TO BE ALLOCATED

Low Center Identifier (CID) (14–25): TELEPHONE
Thru
High Center Identifier (CID) (27–38):

Parameter Identifier (PID) to be Allocated (40–51): DIRECT.COST

Percent to be Allocated (53 54 55 56 57): .

Figure 73
Receiving Accounts Record



RECORD IDENTIFIER

Record Name: R A C T (1 2 3 4)
Record Number: 3 3 0 (5 6 7)

DATA MANAGEMENT MODULE | **DMM**

RECEIVING ACCOUNTS RECORD

REQUIRED | INPUT – DMM-04

Allocation Request Identifier (9 10 11 12): 1

RANGE OF CIDs TO RECEIVE ALLOCATIONS

Low Center Identifier (CID) (14–25): 1.1.0000
Thru
High Center Identifier (CID) (27–38): 6.8

Figure 74
Basis of Allocation Record

RECORD IDENTIFIER

Record Name	Record Number
B A S I (1 2 3 4)	3 3 0 (5 6 7)

DATA MANAGEMENT MODULE	DMM
BASIS OF ALLOCATION RECORD	
REQUIRED	INPUT DMM-04

Allocation Request Identifier (9 10 11 12)	Basis of Allocation Parameter Identifier (PID) (14 15 16 17 18 19 20 21 22 23 24 25)	Weighting Factor for This Basis (27 28 29 30)
1	DIRECT.COST	

The Allocation Request Record in Figure 71 specifies that the results of the distribution are to be included in the DMM matrix under the Parameter Identifier DIRECT.COST. When DMM Program 1 is subsequently used to update the DMM matrix, the dollars distributed to each activity center will be added to the previous DIRECT.COST value.

The "Should Sending Accounts be Offset?" field is usually coded as 'Y'. This option specifies that when a dollar amount is allocated to an activity center, a corresponding amount is subtracted from the "sending" activity center. This avoids double-counting dollars that are allocated to activity centers.

The Sending Accounts Record, Figure 72, specifies the activity centers (TELEPHONE) and the parameter (DIRECT.COST) containing the value to be allocated.

In Figure 73 the Receiving Accounts Record specifies the range of activity centers to which direct costs are to be distributed. This range excludes certain activity centers (such as 8.1, Scholarships, and 9.1, Cost of Purchases for Resale) whose direct costs do not include personnel expenses and to which distribution of these pooled expenses would be inappropriate.

The Basis of Allocation Record in Figure 74 specifies that the amount to be allocated is to be allocated to recipient activity centers in proportion to the direct costs associated with them. In more detailed cost analyses other values could be used as the basis for allocation. In this example, however, this parameter is the only one that exists over the desired range of activity centers.

Figure 75 illustrates the principal report that is produced by this function.

After this step has been completed (including using DMM Program 1 to update the DMM matrix), a portion of the DMM matrix containing NCHEMS U data might appear as shown in Figure 76.

Figure 75
DMM Allocation Report

```
DMM-04/05                                      N   C   H   E   M   S     U                                       PAGE    1
000001.00                                              ALLOCATION REPORT                                          01-01-75

ALLOCATION ID =     1          RESULT PID = DIRECT.COST       DMM OFFSET TRANSACTIONS GENERATED
                     ALLC330     1 DIRECT.COST  E Y
                     SACT330     1 TELEPHONE                  DIRECT.COST  100
                     RACT330     1 1.1.0000       6.8
                     BAST330     1 DIRECT.COST      1

   SENDING ACCOUNTS      CENTER IDENT.     PARAMETER IDENT.               DMM VALUE      PERCENT                AMT. TO BE ALLC.
                         TELEPHONE         DIRECT.COST                   23,500.0000      100.00                     23,500.0000
                         ** TOTALS **                                                                                23,500.0000

   RECEIVING ACCOUNTS    CENTER IDENT.        BASIS PID                 BASIS VALUE   WTG   PERCENT                AMOUNT ALLOCATED
                         1.1.0401.20       DIRECT.COST                   19,059.0000   1      1.40993                       331.3336
                         1.1.0401.30       DIRECT.COST                   45,322.0000   1      3.35278                       787.9033
                         1.1.1501.20       DIRECT.COST                   37,484.9640   1      2.77302                       651.6597
                         1.1.1501.30       DIRECT.COST                   28,514.9700   1      2.10945                       495.7208
                         1.1.1701.20       DIRECT.COST                   34,292.6820   1      2.53687                       596.1645
                         1.1.1701.30       DIRECT.COST                   24,949.8680   1      1.84571                       433.7419
                         1.1.1905.20       DIRECT.COST                   26,253.8843   1      1.94218                       456.4123
                         1.1.1905.30       DIRECT.COST                   18,134.2710   1      1.34152                       315.2572
                         1.1.4999.20       DIRECT.COST                   45,252.0000   1      3.34760                       786.6860
                         1.1.4999.30       DIRECT.COST                   60,690.0000   1      4.48966                     1,055.0701
                         1.3               DIRECT.COST                   16,300.0000   1      1.20582                       283.3677
                         2.1               DIRECT.COST                   56,800.0000   1      4.20189                       987.4442
                         2.2.1905          DIRECT.COST                    3,767.2866   1       .27869                        65.4922
                         4.1               DIRECT.COST                  102,000.0000   1      7.54565                     1,773.2278
                         4.4               DIRECT.COST                  102,000.0000   1      7.54565                     1,773.2278
                         4.6.1905          DIRECT.COST                    4,051.9512   1       .29975                        70.4413
                         5.3               DIRECT.COST                   71,400.0000   1      5.28195                     1,241.2583
                         5.4               DIRECT.COST                   27,500.0000   1      2.03437                       478.0770
                         5.5               DIRECT.COST                  108,000.0000   1      7.98951                     1,877.5349
                         6.1               DIRECT.COST                   29,000.0000   1      2.14533                       504.1526
                         6.2               DIRECT.COST                   46,000.0000   1      3.40294                       799.6909
                         6.5               DIRECT.COST                  445,000.0000   1     32.91973                     7,736.1366
                         ** TOTALS **                                                       100.00000                    23,500.0007
```

Allocation commands supplied by the user.

The $108,000 direct cost in 5.5 Student Auxiliary Services is 7.98 percent of the direct cost in all receiving accounts. This subprogram will therefore receive 7.98 percent or $1,877 of the $23,500 being allocated.

Figure 76
DMM Data After DMM Step 3

Activity Center	Parameter				
	Name	Credit Hours	IWL. 1501.20		Direct Cost
1.1.1501.20	LD English	1,698	429		38,137
1.1.1501.30	UD English	919	137		29,011
1.1.1701.20	LD Math	1,584	207		59,556
1.1.1701.30	UD Math	738	10		43,467
1.3	Comm. Educ.				16,600
2.1	Research Center				57,800
4.1	Libraries				103,800
4.4	Computing Support				103,800
4.6.1905	Acad. Admin.				7,100
5.3	Counseling/Career				72,600
5.4	Fin. Aid–Admin.				28,000
5.5	St. Aux. Services				109,900
6.1	Exec. Mgmt.				29,500
6.2	Fiscal Operations				46,800
6.5	Phy. Plant Oper.				452,700
8.1	Scholarships				300,000
9.1	Cost of Purchases				100,000
9.2	Cap. Expenditures				73,000
9.3-9.4	Cap. Cost–Bldgs.				324,000
9.5-9.6	Cap. Cost–Equip.				98,100

3.93

DMM Step 4--Calculate Direct Unit Costs

DMM Programs 6 and 7 are used in this step to calculate discipline and student program direct unit costs. Figures 77 and 78 illustrate the two important records used as input to this step. (The DMM6 Control Record and the IWLM Definition Record can be omitted and their default values used.) In Figure 77, the Discipline Unit Cost Definition Record specifies that DIRECT.COST is to be divided by CREDIT.HOURS and the result is to be called DIR.COST/CR. The Program CID/PID Definition Record in Figure 78 indicates the parameter names to be used for the student program related costs that are calculated.

The primary report produced in this function is the Program Unit Cost Report shown in Figure 79. This report describes the components of the total cost of the credit hours taken by students in each program and student level.

When this step is completed, the DMM matrix has been updated to include total student program cost and direct unit cost for both disciplines and student programs. This is illustrated in Figure 80.

Figure 77

Discipline Unit Cost Definition Record

RECORD IDENTIFIER

Record Name				Record Number		
D	D	E	F	3	3	5
1	2	3	4	5	6	7

DATA MANAGEMENT MODULE **DMM**

DISCIPLINE UNIT COST DEFINITION RECORD

OPTIONAL

INPUT–DMM-06

NAMES OF PARAMETER IDENTIFIERS (PIDs) FOR DERIVATION OF DISCIPLINE UNIT COST

Cost Parameter Identifier (PID): DIRECT.COST (9–20)

Unit's Parameter Identifier (PID): CREDIT.HOURS (22–33)

New PID? (Y/N): Y (35)

Name of New Discipline Unit Cost Parameter Identifier (PID): DIR.COST/CR (37–48)

Function (C U E R): E (50)

OR

Parameter Identifier (PID) Containing Unit Cost: (52–63)

Figure 78

Program CID/PID Definition Record

RECORD IDENTIFIER

Record Name				Record Number		
P	D	E	F	3	3	5
1	2	3	4	5	6	7

DATA MANAGEMENT MODULE **DMM**

PROGRAM CID PID DEFINITION RECORD

OPTIONAL

INPUT–DMM-06

DEFINITION OF PROGRAM CENTER IDENTIFIER (CID)

Constant Portion

CID Start: (8–9)

Length: (10–11)

Constant (Left Justified): (12–23)

Transfer From IWLM PID Portion

PID Start: (24–25)

Length: (26–27)

CID Start: (28–29)

DEFINITION OF PROGRAM PARAMETER IDENTIFIER (PIDs)

PROGRAM TOTAL COST PARAMETER IDENTIFIER (PID)

Updates? (Y/N): Y (30)

PID Name: DIRECT.COST (31–42)

Function (C U E R): E (43)

PROGRAM IWLM UNITS PARAMETER IDENTIFIER (PID)

Updates? (Y/N): Y (44)

PID Name: CREDIT.HOURS (45–56)

Function (C U E R): E (57)

PROGRAM UNIT COST PARAMETER IDENTIFIER (PID)

Updates? (Y/N): Y (58)

PID Name: DIR.COST/CR (59–70)

Function (C U E R): E (71)

Figure 79
Program Unit Cost Report

```
                                N   C   H   F   M   S    U                                      PAGE   2
DMM-07                           PROGRAM UNIT COST REPORT                                       01-01-75
000006.00

            PROGRAM    DISCIPLINE           FULL.COST/CR       CREDIT.HOURS         FULL.COST

        PRG.0414.20    1.1.0401.20               85.7962           250.0000         21,449.0500
                       1.1.0401.30              109.5829            43.0000          4,712.0647
                       1.1.1501.20               73.8959           385.0000         28,449.9215
                       1.1.1501.30              101.0356            43.0000          4,344.5308
                       1.1.1701.20              119.0053           319.0000         37,962.6907
                       1.1.1701.30              182.4753            15.0000          2,737.1295
                       1.1.1905.20              119.8961           350.0000         41,963.6350
                       1.1.1905.30              126.1324            27.0000          3,405.5748
                       1.1.4999.20               61.5392           453.0000         27,877.2576
                       1.1.4999.30               70.6340           170.0000         12,007.7800

        PRG.0414.20    **TOTALS**                89.9804         2,055.0000        184,909.6346

        PRG.0414.30    1.1.0401.20               85.7962            67.0000          5,748.3454
                       1.1.0401.30              109.5829           489.0000         53,586.0381
                       1.1.1501.20               73.8959            80.0000          5,911.6720
                       1.1.1501.30              101.0356            10.0000          1,010.3560
                       1.1.1701.20              119.0053            59.0000          7,021.3127
                       1.1.1701.30              182.4753           146.0000         26,641.3938
                       1.1.1905.20              119.8961            43.0000          5,155.5323
                       1.1.1905.30              126.1324           450.0000         56,759.5800
                       1.1.4999.20               61.5392            81.0000          4,984.6752
                       1.1.4999.30               70.6340           597.0000         42,168.4980

        PRG.0414.30    **TOTALS**               103.3568         2,022.0000        208,987.4035

        PRG.1501.20    1.1.0401.20               85.7962            56.0000          4,804.5872
                       1.1.0401.30              109.5829             5.0000            547.9145
                       1.1.1501.20               73.8959           429.0000         31,701.3411
                       1.1.1501.30              101.0356           137.0000         13,841.8772
                       1.1.1701.20              119.0053           207.0000         24,634.0971
                       1.1.1701.30              182.4753            10.0000          1,824.7530
                       1.1.1905.20              119.8961            80.0000          9,591.6880
                       1.1.1905.30              126.1324            13.0000          1,639.7212
                       1.1.4999.20               61.5392           700.0000         43,077.4400
                       1.1.4999.30               70.6340            87.0000          6,145.1580

        PRG.1501.20    **TOTALS**                79.9354         1,724.0000        137,808.5773

        PRG.1501.30    1.1.0401.20               85.7962            45.0000          3,860.8290
                       1.1.0401.30              109.5829            89.0000          9,752.8781
                       1.1.1501.20               73.8959           115.0000          8,498.0285
                       1.1.1501.30              101.0356           480.0000         48,497.0880
                       1.1.1701.20              119.0053            53.0000          6,307.2809
                       1.1.1701.30              182.4753           107.0000         19,524.8571
                       1.1.1905.20              119.8961            31.0000          3,716.7791
                       1.1.1905.30              126.1324            75.0000          9,459.9300
                       1.1.4999.20               61.5392            82.0000          5,046.2144
                       1.1.4999.30               70.6340           873.0000         61,663.4820

        PRG.1501.30    **TOTALS**                90.4243         1,950.0000        176,327.3671
```

Students majoring in Lower Division Biochemistry took credit hours from these disciplines

Total cost of all credit hours taken by students majoring in Lower Division Biochemistry.

Figure 80
DMM Direct Cost Data

	Parameter				
Activity Center	Name		Credit. Hours	Direct. Cost	Dir. Cost/Cr.
1.1.1501.20	LD English		1,698	38,137	22.46
1.1.1501.30	UD English		919	29,011	31.57
1.1.1701.20	LD Math		1,584	59,556	37.60
1.1.1701.30	UD Math		738	43,467	58.90
Prg. 1501.20	LD English		1,724	42,215	24.49
Prg. 1501.30	UD English		1,950	54,613	28.00
Prg. 2001.20	LD Psychology		1,252	33,749	26.96
Prg. 2001.30	UD Psychology		1.150	37,054	32.22

DMM Step 5--Allocate Support Cost Centers

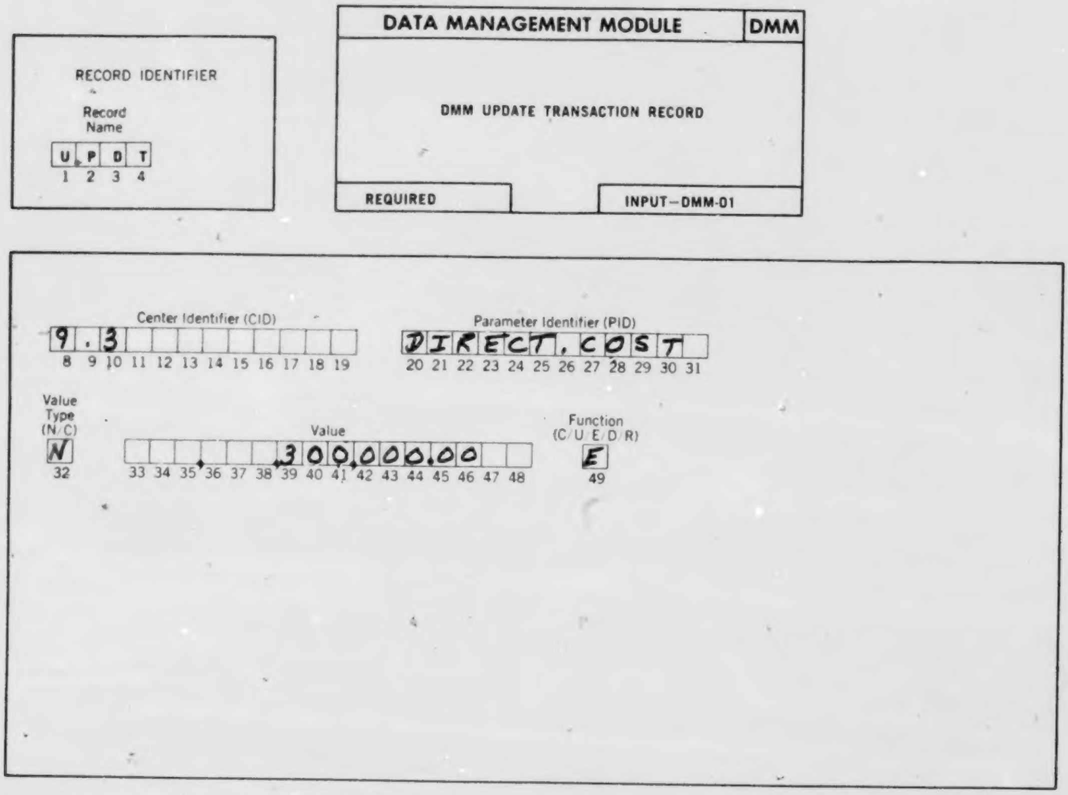
In this step the IEP support activity centers are allocated to the IEP final cost objectives. For IEP purposes, the centers to be included in each of these categories and the basis for allocating these support costs are described on page 2.49.

This step requires the use of square footage and additional capital expenditure data that have not previously been described as input to the Data Management Module. The definition of the appropriate values to be used is described as Step 6 of the Information Exchange Procedures on page 2.43. These values are actually supplied to DMM through the use of DMM Update Records. Figures 81 and 82 illustrate the Update Records for two of these values. The Update Records containing these data may be appended to other Update Records in any of the preceding runs of DMM Program 1, or a separate run of DMM Program 1 may be made at this time to incorporate these values in the DMM matrix.

Square footage data may not be available at the level of detail required for subsequent calculations (course level within discipline). If the data are available for a more aggregate activity center (such as discipline or even total instructional), these aggregate data could be provided prior to DMM Step 3 and then DMM Step 3 could include allocation requests to allocate these aggregate data to the more detailed levels. (If this allocation is necessary, an available allocation parameter, such as credit hours or preliminary direct cost, would have to be used as the basis for distribution. Because this tends to make square footage data highly correlated with the allocation basis parameter, it is questionable whether the added effort is worthwhile. It may be as appropriate to simply use the credit hours or the direct cost data as the allocation parameter in DMM Step 6, eliminate the use of square footage data, and avoid the possibility of suggesting the use of data and a level of accuracy that does not really exist.)

(Note that in Figure 81 only $300,000 is being added to 9.4, Capital Cost of Buildings and Land Improvements. This is the calculated amount from Figure 10 on page 2.46. The other $20,000--from Account 54-901--was crossed over to 9.4 in ACM Phase 1. Likewise, the calculated use factor for equipment of $27,100 is added to 9.6, Capital Cost of Equipment.)

Figure 81
DMM Update Transaction Record—Capital Cost Data



RECORD IDENTIFIER

Record Name: U P D T (1 2 3 4)

DATA MANAGEMENT MODULE | DMM

DMM UPDATE TRANSACTION RECORD

REQUIRED | INPUT—DMM-01

Center Identifier (CID) (8–19): 9.3

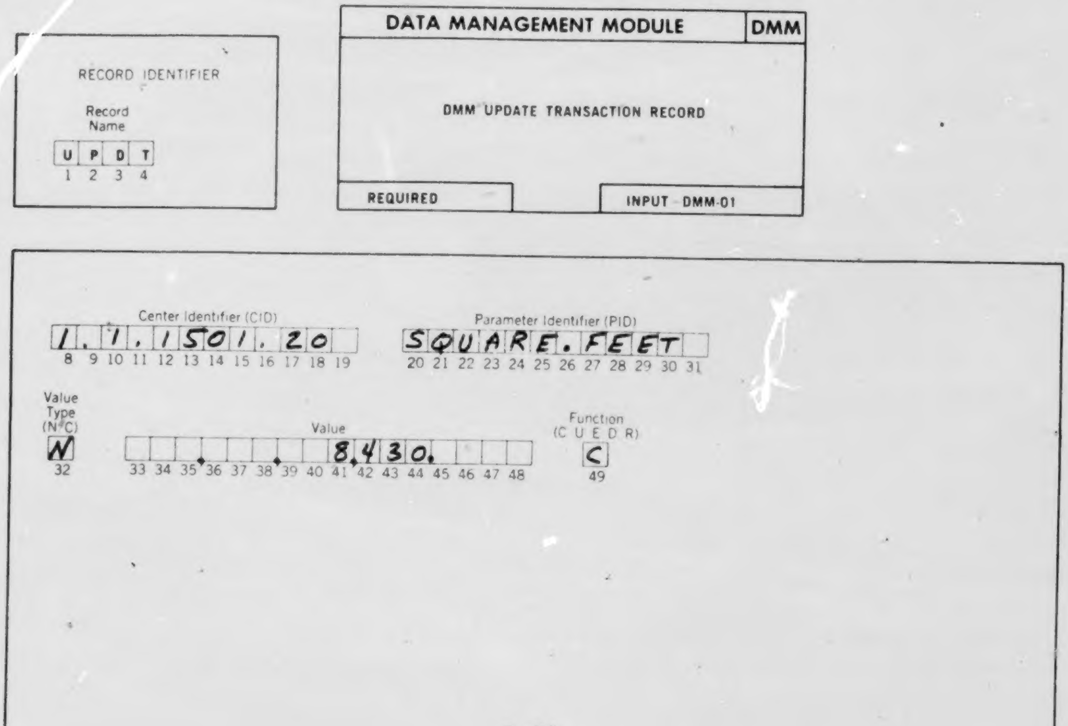
Parameter Identifier (PID) (20–31): DIRECT.COST

Value Type (N/C) (32): N

Value (33–48): 300000.00

Function (C/U/E/D/R) (49): E

Figure 82
DDM Update Transaction Record—Square Foot Data



RECORD IDENTIFIER

Record Name: U P D T (1 2 3 4)

DATA MANAGEMENT MODULE | DMM

DMM UPDATE TRANSACTION RECORD

REQUIRED | INPUT—DMM-01

Center Identifier (CID) (8–19): 1.1.1501.20

Parameter Identifier (PID) (20–31): SQUARE.FEET

Value Type (N/C) (32): N

Value (33–48): 8430.

Function (C/U/E/D/R) (49): C

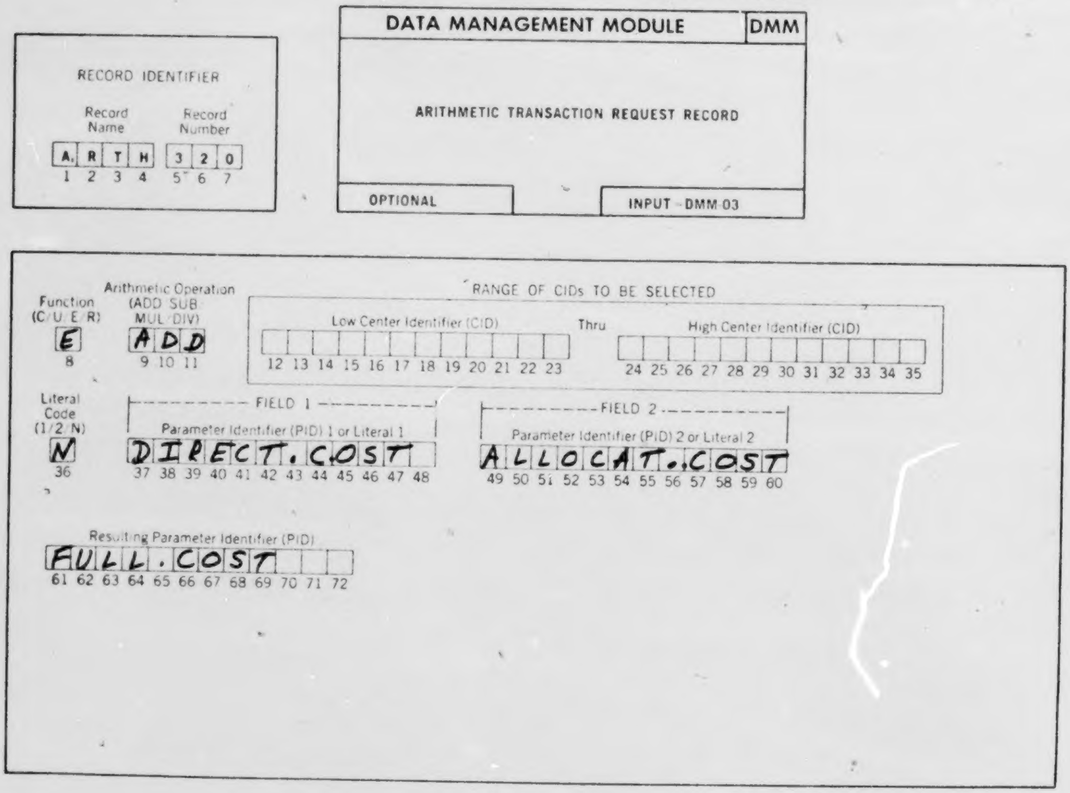
Once the data described above have been supplied to the Data Management Module, the allocation of support cost employs the same DMM programs and similar DMM instructions to those used in allocating direct costs in DMM Step 3. As shown on page 2.49, many of the support activity centers are allocated to the same final cost objectives using the same allocation parameter. Because of this and because of the capability of expressing ranges for both sending and receiving activity centers on DMM records, it is possible to perform all allocations using only five allocation requests. The DMM instructions for making these allocations are shown in Figure 93 in the sample DMM data.

To permit determining the amount allocated to each activity center, the results of the allocations are included in the DMM matrix in a column headed ALLOCAT.COST.

DMM Step 6--Calcluate Full Cost

The parameters DIRECT.COST and ALLOCAT.COST are added together in this step to produce FULL.COST for all activity centers. Figure 83 illustrates the DMM Arithmetic Transaction Request Record, which is used to perform the arithmetic.

Figure 83
Arithmetic Transaction Request Record



RECORD IDENTIFIER

Record Name: A R T H (1 2 3 4)

Record Number: 3 2 0 (5 6 7)

DATA MANAGEMENT MODULE | DMM

ARITHMETIC TRANSACTION REQUEST RECORD

OPTIONAL

INPUT - DMM 03

Function (C/U/E/R): E (8)

Arithmetic Operation (ADD SUB MUL/DIV): ADD (9 10 11)

RANGE OF CIDs TO BE SELECTED

Low Center Identifier (CID): (12 13 14 15 16 17 18 19 20 21 22 23) Thru High Center Identifier (CID): (24 25 26 27 28 29 30 31 32 33 34 35)

Literal Code (1/2/N): N (36)

FIELD 1 — Parameter Identifier (PID) 1 or Literal 1: DIRECT.COST (37 38 39 40 41 42 43 44 45 46 47 48)

FIELD 2 — Parameter Identifier (PID) 2 or Literal 2: ALLOCAT.COST (49 50 51 52 53 54 55 56 57 58 59 60)

Resulting Parameter Identifier (PID): FULL.COST (61 62 63 64 65 66 67 68 69 70 71 72)

Figure 84 illustrates relevant portions of the DMM matrix after these functions have been performed. The negative amounts under the ALLOCAT. COST parameter for the support activity centers were generated because of the default value for the "Should Sending Accounts be Offset" field on the Allocation Request Record in DMM Step 5. This negative amount will offset the direct cost values in each of the support activity centers and provide a zero full cost value.

Figure 84

DMM Allocated Costs and Full Total Cost

Activity Center	Parameter					
	Name		Direct.Cost		Allocat.Cost	Full.Cost
1.1.1501.20	LD English		38,137		87,339	125,476
	UD English		29,011		63,841	92,852
	LD Math		59,556		128.949	188,505
1.1.1701.30	UD Math		43,467		91,200	134,667
1.3	Comm. Educ.		16,600		32,832	49,432
2.1	Research Center		57,800		13,156	70,956
4.1	Libraries		103,800		–103,800	
4.4	Computing Support		103,800		–103,800	
4.6.1905	Acad. Admin.		7,100		– 7,100	
5.3	Counseling Career		72,600		– 72,600	
5.4	Fin. Aid Admin.		28,000		– 28,000	
5.5	St. Aux. Services		109,900		170,607	280,507
6.1	Exec. Mgmt.		29,500		– 29,500	
6.2	Fiscal Operations		46,800		– 46,800	
6.5	Phy. Plant Oper.		452,700		–452,700	
8.1	Scholarships		300,000			300,000
9.1	Cost of Purchases		100,000			100,000
9.2	Cap. Expenditures		73,000			73,000
9.3-9.4	Cap. Cost–Bldgs.		324,000		–324,000	
9.5-9.6	Cap. Cost–Equip.		98,100		– 98,100	

DMM Step 7--Calculate Full Unit Costs

The calculation of discipline and student program full unit costs is identical to the direct unit cost calculations in DMM Step 4 with the exception that several default parameters must be overridden to avoid destroying direct cost values already in the DMM matrix. Figures 85 and 86 illustrate the records to be used to specify the full cost parameters. As in DMM Step 4, the DMM6 Control Record and the IWLM Definition Record can be omitted. (Note that the Program CID/PID Definition Record specifies that Program IWLM updates are not to be produced. If this field is left blank, the updates will be produced by default and the resulting values will be added to the values generated in the calculation of direct unit cost--DMM Step 4.)

After this step has been performed, the relevant portions of the DMM matrix appear as shown in Figure 87.

Figure 85
Discipline Unit Cost Definition Record

RECORD IDENTIFIER

Record Name				Record Number		
D	D	E	F	3	3	5
1	2	3	4	5	6	7

DATA MANAGEMENT MODULE	DMM
DISCIPLINE UNIT COST DEFINITION RECORD	
OPTIONAL	INPUT–DMM-06

NAMES OF PARAMETER IDENTIFIERS (PIDs) FOR DERIVATION OF DISCIPLINE UNIT COST

Cost Parameter Identifier (PID): FULL.COST (9–20)

Unit's Parameter Identifier (PID): CREDIT.HOURS (22–33)

New PID? (Y/N): Y (35)

Name of New Discipline Unit Cost Parameter Identifier (PID): FULL.COST/CR (37–48)

Function (C U E R): E (50)

OR

Parameter Identifier (PID) Containing Unit Cost: (52–63)

Figure 86
Program CID/PID Definition Record

RECORD IDENTIFIER

Record Name				Record Number		
P	D	E	F	3	3	5
1	2	3	4	5	6	7

DATA MANAGEMENT MODULE	DMM
PROGRAM CID PID DEFINITION RECORD	
OPTIONAL	INPUT–DMM-06

DEFINITION OF PROGRAM CENTER IDENTIFIER (CID)

Constant Portion

CID Start: (8 9)

Length: (10 11)

Constant (Left Justified): (12–23)

Transfer From IWLM PID Portion

PID Start: (24 25)

Length: (26 27)

CID Start: (28 29)

DEFINITION OF PROGRAM PARAMETER IDENTIFIER (PIDs)

PROGRAM TOTAL COST PARAMETER IDENTIFIER (PID)

Updates? (Y/N): Y (30)

PID Name: FULL.COST (31–42)

Function (C/U E R): E (43)

PROGRAM IWLM UNITS PARAMETER IDENTIFIER (PID)

Updates? (Y/N): N (44)

PID Name: (45–56)

Function (C U E R): (57)

PROGRAM UNIT COST PARAMETER IDENTIFIER (PID)

Updates? (Y/N): Y (58)

PID Name: FULL.COST/CR (59–70)

Function (C U E R): E (71)

Figure 87
DMM Full Unit Costs

Activity Center	Parameter						
	Name	Credit.Hours	Direct.Cost	Dir. Cost/Cr.	Allocat. Cost	Full.Cost	Full Cost/Cr.
1.1.1501.20	LD English	1,698	38,137	22.46	87,339	125,476	73.90
1.1.1501.30	UD English	919	29,011	31.57	63,841	92,852	
1.1.1701.20	LD Math	1,584	59,556	37.60	128,949	188,505	119.01
1.1.1701.30	UD Math	738	43,467	58.90	91,200	134,667	182.47
PRG. 1501.20	LD English	1,724	42,215	24.49		137,809	79.94
PRG. 1501.30	UD English	1,950	54,613	28.00		176,327	90.42
PRG. 2001.20	LD Psychology	1,252	33,749	26.96		109,293	87.29
PRG. 2001.30	UD Psychology	1,150	37,054	32.22		118,429	102.98

DMM Step 8--Display Results

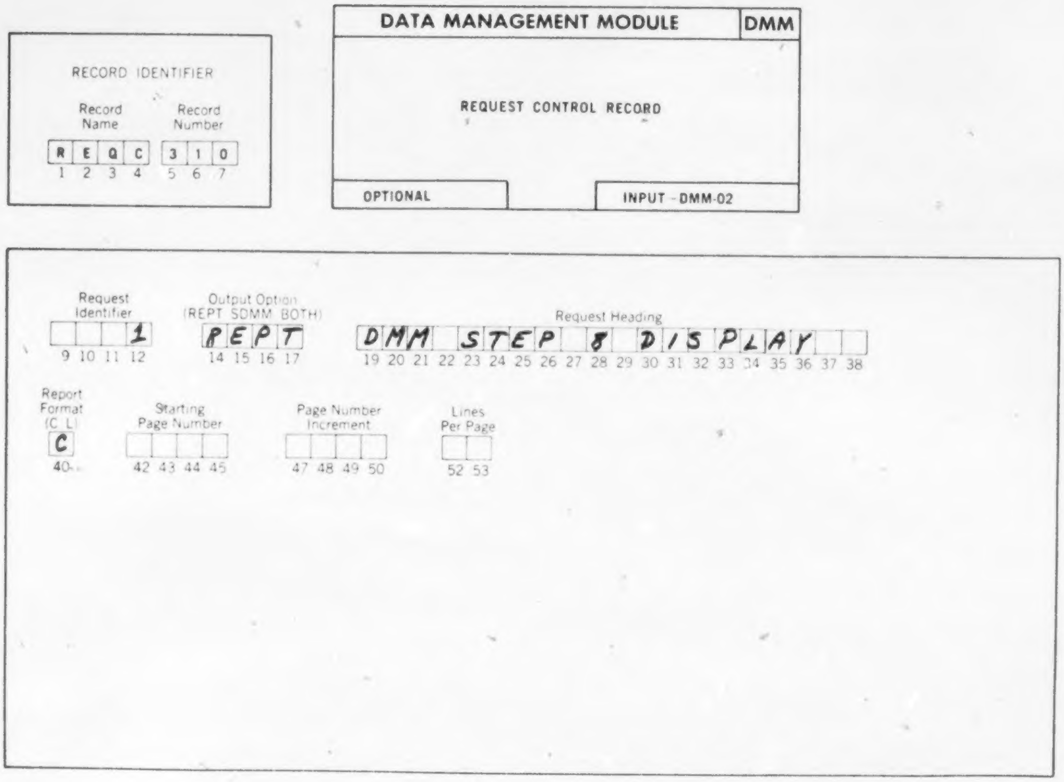
After requesting the recommended DMM data from the SDM, PDM, and ACM and after completing the seven DMM steps described earlier, the DMM matrix contains the parameters listed in Figure 88. This step describes how to request reports containing only selected portions of the DMM matrix.

Figure 89 contains the Request Control Record. Note that the Report Format field contains a 'C' rather than the 'L' used in DMM Step 2. The columnar format being requested by this field produces a more readable report than the linear format used earlier.

Figure 88
Partial DMM PID Description

	Source	Description	Range of CIDs
ENROLL.HEAD ENROLL.FULL ENROLL.PART ENROLL.FTE	SDM-DMM Step 1 SDM-DMM Step 1 SDM-DMM Step 1 SDM-DMM Step 1	Headcount enrollment in student programs Full time enrollment in student programs Part time enrollment in student programs Full time equivalent enrollment in student programs	PRG.0000.00 - PRG.9999.99
CREDIT.HOURS	SDM-DMM Step 1	Total number of credit hours taken in each discipline/course level and each program/student level	PRG.0000.00 - PRG.9999.99 1.1.0000.00 - 1.3.9999.99
COMPENSATION	PDM-ACM Step 1	Compensation amounts	1.1.0000.00 - 7.2
DIRECT.COST	DMM Step 3	Total direct cost for each activity center	1.1.0000.00 - 7.2 PRG.0000.00 - PRG.9999.99
ALLOCAT.COST FULL.COST	DMM Step 5 DMM Step 6	Allocated support costs Total full cost for each activity center	1.1.0000.00 - 3.4, 5.5, 5.6, 6.6
DIR.COST/CR FULL.COST/CR	DMM Step 4 DMM Step 7	Direct unit costs for disciplines and student programs Full unit cost for disciplines and student programs	1.1.0000.00 - 1.4.9999.99 PRG.0000.00 - PRG.9999.99
PRG.DIR.COST PRG.FUL.COST	DMM Step 4 DMM Step 7	Student program total direct cost Student program total full cost	PRG.0000.00 - PRG.9999.99
PERSON.UNITS	PDM-DMM Step 1	Person Units (e.g., service months) in each activity center	1.1.0000.00 - 7.2
NAME	DMM Step 1	Titles for IEP Activity Centers	1.1.0000.00 - 9.4 PRG.0000.00 - PRG.9999.99

Figure 89
Request Control Record



RECORD IDENTIFIER

Record Name (1–4): R E Q C

Record Number (5–7): 3 1 0

DATA MANAGEMENT MODULE — DMM

REQUEST CONTROL RECORD

OPTIONAL

INPUT - DMM-02

Request Identifier (9–12): 1

Output Option (REPT SDMM BOTH) (14–17): REPT

Request Heading (19–38): DMM STEP 8 DISPLAY

Report Format (C L) (40): C

Starting Page Number (42–45):

Page Number Increment (47–50):

Lines Per Page (52–53):

Optional records are available for specifying either the range of activity centers or the range of parameters to be printed on a particular report. Figures 90 and 91 illustrate these records. This example specifies that the DIRECT.COST values for activity centers 1.1 through 9.6 are to be displayed as the second column of the report. Up to five columns (parameters) may be specified for each report request, so up to four other PID Selection Records can be submitted in this same request. (To provide more readable titles for activity centers, the parameter 'NAME' is usually printed in report column 1. If this convention is followed, there are actually only four columns available for numeric data on each report.)

Figure 90
CID Selection Record

RECORD IDENTIFIER

Record Name				Record Number		
C	I	D	S	3	1	0
1	2	3	4	5	6	7

DATA MANAGEMENT MODULE | **DMM**

CID SELECTION RECORD

OPTIONAL | INPUT–DMM-02

Request Identifier (9 10 11 12): 1

RANGE OF CIDs TO BE SELECTED

Low Center Identifier (CID) (14–25): 1.1.0000

Thru

High Center Identifier (CID) (27–38): 9.6

Figure 91
PID Selection Record

RECORD IDENTIFIER

Record Name				Record Number		
P	I	D	S	3	1	0
1	2	3	4	5	6	7

DATA MANAGEMENT MODULE | **DMM**

PID SELECTION RECORD

OPTIONAL | INPUT–DMM-02

Request Identifier (9 10 11 12): 1

PID Column Location (13): 2

RANGE OF PIDs (WITHIN CIDs) TO BE SELECTED

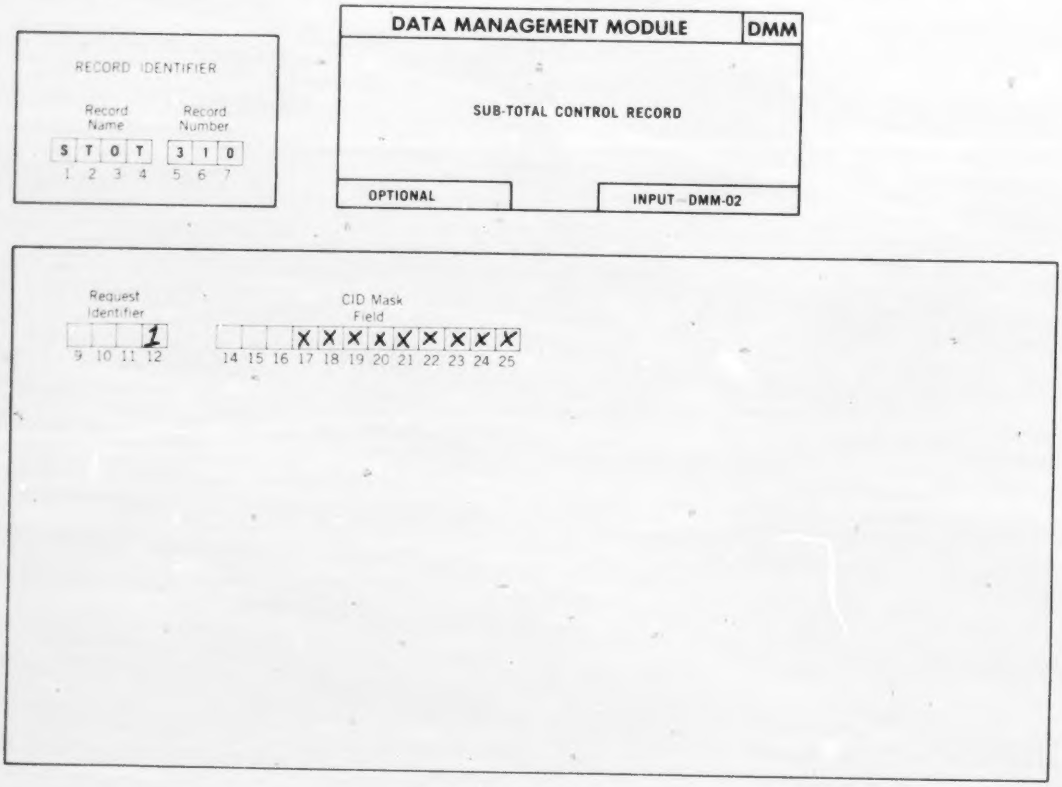
Low Parameter Identifier (PID) (14–25): DIRECT.COST

Thru

High Parameter Identifier (PID) (27–38):

The Sub-Total Control Record shown in Figure 92 may be used to obtain subtotals of numeric data being displayed. Blank positions in the CID Mask Field specify "control break" positions that indicate when a subtotal is to be printed. In Figure 92, a subtotal will be printed when any of the first three positions of the activity center identifier change. This will provide subtotals for each IEP subprogram (1.1, 4.1, 4.2, and so forth).

Figure 92
Sub-Total Control Record



RECORD IDENTIFIER

Record Name				Record Number		
S	T	O	T	3	1	0
1	2	3	4	5	6	7

DATA MANAGEMENT MODULE | **DMM**

SUB-TOTAL CONTROL RECORD

OPTIONAL

INPUT DMM-02

Request Identifier			
			1
9	10	11	12

CID Mask Field											
			X	X	X	X	X	X	X	X	X
14	15	16	17	18	19	20	21	22	23	24	25

EXAMPLE OF DMM DATA

The output from several DMM programs has been illustrated earlier. In addition to these reports, DMM provides a number of other reports which are more detailed and which provide "audit trails" for the DMM run and the results produced.

Figure 93 summarizes the DMM control records for the DMM steps described earlier. Many users will find that these control records--with only minor modifications--can be used for their initial DMM processing.

SUMMARY

The introduction to this manual stated that there are many ways to conduct a cost study and process data through the NCHEMS Costing and Data Management System. One approach has been quite thoroughly documented here. It is hoped that this detailed approach will help the user through initial cost study efforts and will provide a foundation for more sophisticated and detailed analyses which many users may wish to perform to provide even more meaningful management information.

```
00000000011111111112222222222333333333344444444445555555555666666666677777777778
12345678901234567890123456789012345678901234567890123456789012345678901234567890

DMM1300                    N C H E M S  U                 N   Perform initial update            DMM Step 1

REQC310     1 REPT STEP 2 DISPLAY        L                    Display DMM file                  DMM Step 2

ALLC330     1 DIRECT.COST   E Y                          }
SACT330     1 TELEPHONE                  DIRECT.COST  100 }   Distribute telephone costs.       DMM Step 3
RACT330     1 1.1.0000      6.8                          }
RASI330     1 DIRECT.COST     1                          }

IDEF3351.0          1.5
                                                              Calculate direct unit costs.      DMM Step 4
ALLC330 1     ALLOCAT.COST    Y                          }
SACT330 1     4.1           4.2.9999    DIRECT.COST      }
SACT330 1     4.4           4.6.9999    DIRECT.COST      }
SACT330 1     4.8           4.8.9999    DIRECT.COST      }
RACT330 1     1.1           3.4                          }
RASI330 1     DIRECT.COST                                }    Allocate support cost centers     DMM Step 5
ALLC330 2     ALLOCAT.COST    Y                          }
SACT330 2     4.3           4.3.9999    DIRECT.COST      }
SACT330 2     4.7           4.7.9999    DIRECT.COST      }
RACT330 2     1.1           1.2.999                      }
RASI330 2     DIRECT.COST                                }
ALLC330 3     ALLOCAT.COST    Y                          }
SACT330 3     5.1           5.4         DIRECT.COST      }
SACT330 3     6.8                       DIRECT.COST      }
RACT330 3     1.1           1.2.9999                     }
RASI330 3     CREDIT.HOURS                               }
ALLC330 4     ALLOCAT.COST    Y                          }
SACT330 4     6.1           6.5         DIRECT.COST      }
SACT330 4     6.7           6.7.9999    DIRECT.COST      }
SACT330 4     9.3           9.4         DIRECT.COST      }
RACT330 4     1.1           3.4                          }
RACT330 4     5.5           5.6                          }
RACT330 4     6.6                                        }
RASI330 4     DIRECT.COST

DUP 320 CID1.0.          9.5.        ALLOCAT.COSTFULL.COST
ARTH320 DIV1.1           1.2        NPERSON.UNITSCREDIT.HOURSPROD.RATIO   Calculate full cost          DMM Step 6
DUP 320 CID1.0.          9.5.        DIRECT.COST FULL.COST                (and productivity ratio)

DDEF335 FULL.COST                    FULL.COST/CR                  }
PDEF335                          FULL.COST    N                    }
IDEF3351.0          1.5                                FULL.COST/CR }  Calculate full unit      DMM Step 7
                                                                   }  costs.
REQC310     1                                                      }
CIDS310     1 1.0000        9.9                                    }
STOT310     1     ********                                         }
PIDS310     11NAME                                                 }
PIDS310     12PERSON.UNITS                                         }
PIDS310     13DIRECT.COST                                          }
PIDS310     14ALLOCAT.COST                                         }  Display final results    DMM Step 8
PIDS310     15FULL.COST                                            }  (only a partial set of
REQC310     2                                                      }  data displayed here).
CIDS310     2 PRG.0000      1.2                                    }
PIDS310     21NAME                                                 }
PIDS310     22DIR.COST/CR                                          }
PIDS310     23FULL.COST/CR                                         }
PIDS310     24PROD.RATIO                                           }
PIDS310     25CREDIT.HOURS                                         }

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APPENDIX

FUNDAMENTAL CONSIDERATIONS FOR DETERMINING COST INFORMATION IN HIGHER EDUCATION

Fundamental Considerations for Determining Cost Information in Higher Education

For many years cost information and cost analysis have been recognized by administrators in higher education as useful tools in managing the internal affairs of their institutions. More recently, federal, state, and other funding and policy-setting bodies have indicated additional needs for cost information, especially in the process of appropriating and granting funds to higher education.

For cost information to be useful, it is essential that the fundamentals for determining and using costs be understood. Heretofore, these fundamentals have not been compiled as a basis for developing cost information in higher education.

In formulating fundamental considerations for the development and use of costs, higher education has available the existing body of knowledge already developed, tested, and proven in areas other than higher education. After appropriate modifications, such cost fundamentals are helpful in identifying how cost can be determined and applied by institutions of higher education. However, in applying such fundamentals, consideration should be given to the particular characteristics and objectives of these institutions.

The determination of cost information is a process of approximation, and requires the individual performing cost determinations to exercise judgment based on circumstances relevant to the purposes for which cost information is collected. Different cost results occur even when equally valid alternative approaches are used. Determination of the approach is often based on practicability, as long as the results are valid and meaningful for the purposes intended.

There have been attempts to use a single methodology for determining cost to satisfy a wide variety of purposes for which cost information is used. This chapter indicates the need for different cost determination methods and approaches to satisfy the variety of purposes for determining cost rather than using a single method for all purposes. It describes the available methods, approaches, and related considerations for determining costs.

In order to place in perspective the various aspects of costing described in the sections that follow, it is well to visualize the complete costing process. The term "costing" is used here to denote the cost determination process. The essential factors involved in determining costs in higher education and their interrelationships are shown in the exhibit on the following page.

Foremost among these factors are costing standards to be applied in determining cost; they serve as the foundation on which costing is performed. Before costing can begin, however, it is necessary that the purposes of cost information be clearly identified. Once the purposes are defined, then the definitions of cost, the cost objectives and costing units, the types and classifications of cost, and the financial accounting and statistical data to be used to provide the desired cost information can be specified.

At this stage the appropriate cost determination methodology should be formulated. The methodology can be either the specific service method (job order method), the continuous service method (process method), or a combination of the two methods. These methods are described in detail in the section "Cost Determina-

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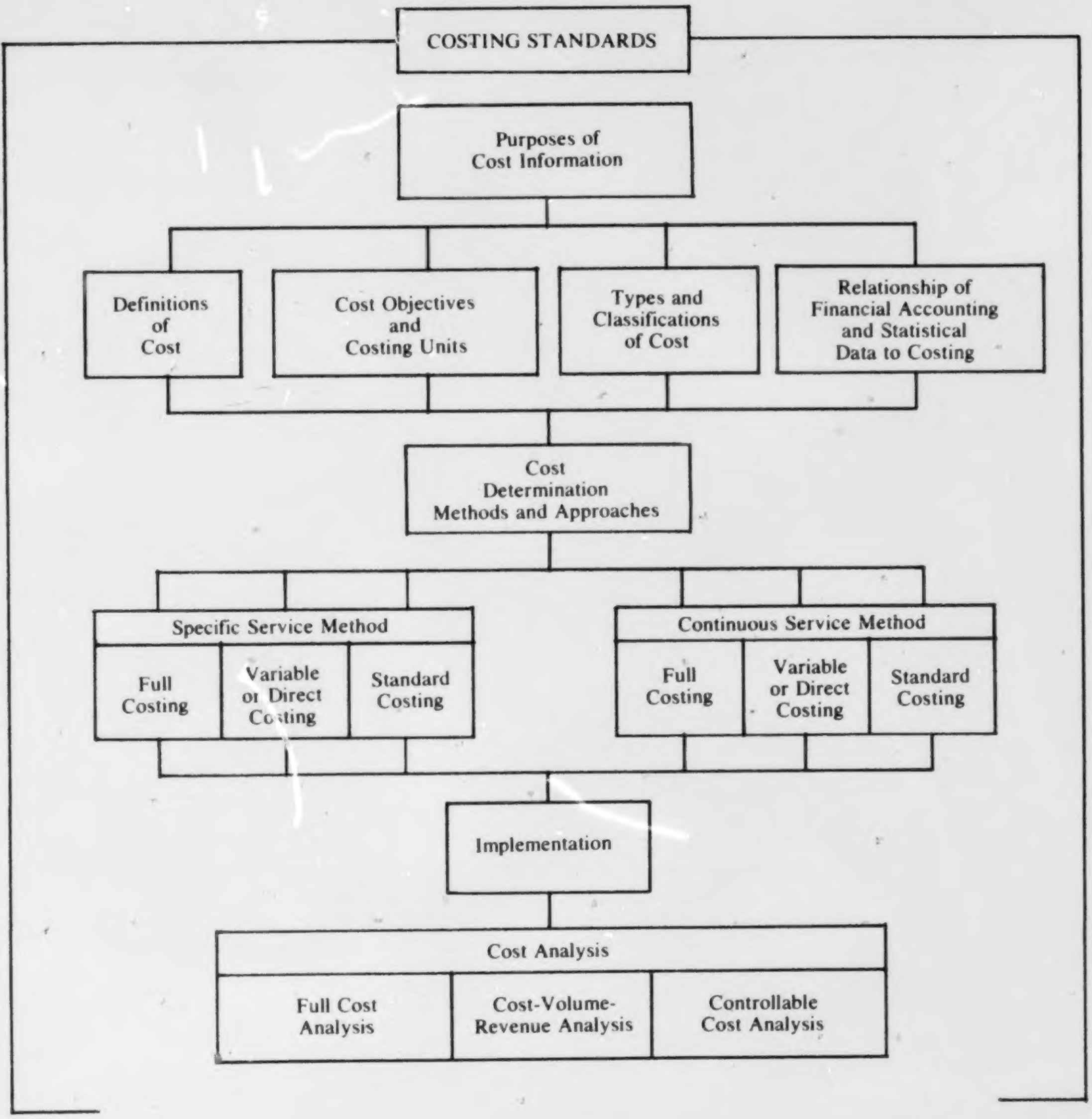
COSTING STANDARDS
Purposes of Cost Information
Definitions of Cost
Cost Objectives and Costing Units
Types and Classifications of Cost
Relationship of Financial Accounting and Statistical Data to Costing
Cost Determination Methods and Approaches
Specific Service Method
Full Costing
Variable or Direct Costing
Standard Costing
Continuous Service Method
Full Costing
Variable or Direct Costing
Standard Costing
Implementation
Cost Analysis
Full Cost Analysis
Cost-Volume-Revenue Analysis
Controllable Cost Analysis

tion Methods and Approaches." Within these methods full costing, variable or direct costing, or standard costing approaches can be employed. Based on the methodology selected, costing procedures are implemented. The resultant cost information serves as the subject of cost analysis, which is the process of examining cost and statistical information and deriving meaning to satisfy the needs of users. The three basic cost analysis categories are full cost analysis, cost-volume-revenue analysis, and controllable cost analysis.

PURPOSES OF COST INFORMATION

There are many purposes for determining cost information to satisfy both internal and external requirements. It is essential that the purpose of obtaining cost information be identified at the outset in order that appropriate definitions and methods of costing can be selected.

For a college or university, cost information is used for purposes of assisting in planning and budgeting, in controlling, and in evaluating performance. The process of planning and budgeting is designed to formulate the approach to be followed by an institution in achieving its long-term mission and shorter-term goals and objectives. In the planning and budgeting process, cost information is one factor used in examining alternatives, determining the cost requirements of each alternative, and selecting those alternatives consistent with the most effective utilization of available resources. Cost information may be used in modifying the budget plan during the operating period by indicating the cost consequences of proposed actions in view of changes in priorities, economic conditions, and other circumstances that could not have been foreseen during the planning and budget process.

In controlling current operations, cost information is a valuable indicator for identifying areas in which current budgetary adjustments may be required or corrective actions needed. The control process involves the comparison of incurred cost to budgeted cost. Variances identified in the control process are examined to determine the appropriate action to be taken.

Cost information is one among many important aspects in the evaluation of performance. Evaluation involves an after-the-fact examination of results and assists in determining whether the educational and related activities conducted were as effective as anticipated and whether institutional resources were appropriate to support these activities. By comparing the results of operations to the original plan, areas can be identified in which adjustments may be needed in future planning and budgeting. Cost information also is used in determining interdepartmental charges in the financial accounting system.

Cost information is used by federal, state, and local bodies responsible for appropriating public funds. Foundations and other granting bodies also are interested in cost information. Through the years, these granting bodies have been interested in cost information (and other information) to assist them in determining whether they will use their funds to support a need. This information also has been used by granting bodies to reimburse direct and indirect costs related to grants and contracts for specific programs. Certain governmental and private funding agencies have established required costing procedures for reimbursement purposes.

COSTING TERMS

For the purpose of determining cost information, it is necessary to establish definitions of cost and their relationship to cost objectives and costing units.

Definitions of Cost

The term "cost" is defined in different ways, depending on the objectives for which costs are determined. Three commonly used definitions of cost are derived from financial accounting, cost accounting, and economics.

Financial accounting is concerned with recording, classifying, summarizing, and analyzing financial data. The financial accounting definition treats cost as the amount or equivalent paid or charged for something of value. In this sense, cost represents the total value sacrificed to obtain assets and to receive goods and services. Another term very much a part of the cost concept is "expense." For financial accounting purposes, expense is the expired portion of cost applicable to a specific period. Therefore, the cost of acquired assets that benefit future periods, such as inventories and capital assets, is not considered an expense at the time of acquisition, but is deferred until the assets are used. The term "expense" should not be confused with the term "expenditure." Expenditures include all expenses except depreciation and also include the acquisition cost of capital assets.

Cost accounting is concerned with accumulating, classifying, summarizing, interpreting, and reporting the cost of personnel, goods and services, and other expenses incurred to determine unit costs. Expenses incurred during a specified period, as defined by financial accounting, are the prime ingredient of cost accounting for cost determination purposes. The costing process is designed to assign or allocate costs to particular units of service provided. The costs derived may be actual costs or may be other costs such as replacement, projected, or imputed costs. The primary difference between cost accounting and financial accounting is that the former involves obtaining unit cost information and the latter involves obtaining costs primarily by organizational unit and function.

In economics, cost can be viewed from the "macro" or "micro" point of view. The macro definition of cost typically considers society as a whole rather than focusing attention on a particular institution. For example, the economist considers opportunities sacrificed by the community at large as societal costs external to the institution. On the other hand, the micro definition of cost used in economics focuses on the activities of an organization. This definition, in addition to considering expired cost (expense), may include other costs such as replacement, projected, or imputed costs. This latter definition is similar to that often used in cost accounting.

The definition of cost depends on the purposes for which cost information is to be used. There is no single definition of cost that will satisfy the variety of needs for cost information. Accordingly, significant differences in cost information will be derived, depending on the selection of cost definitions used for different purposes.

Cost Objectives and Costing Units

A cost objective is a defined entity to which cost is related, and can be an organizational unit, a project, responsibility center, function, program, or some other identifiable entity. Cost is accumulated and assigned to cost objectives for purposes of measuring the cost of processes or specific services. The cost objectives used in the costing process are based on the purposes for which cost information will be used and the level of cost aggregation desired. Different costs, and therefore different cost objectives, are required for different purposes.

Costing units are measures reflecting the activities or outputs of cost objectives, and bear a relationship to the incurrence of cost.

In commercial organizations, cost generally can be assigned to well-defined and measurable products or services. In higher education, however, the services of instruction, research, and public service may not be measurable or separable in terms of units of output. For example, the instructional process produces an output sometimes referred to as an acquired body of knowledge; however, there is no consensus on how to measure the acquired knowledge as an output. Full-time-equivalent students, student credit-hours, student contact-hours, student headcount, student major by level, and degrees awarded are examples of costing units of service used to measure the instructional process in lieu of output measures. These units are not measures of quality or efficiency.

Measurable units of output are available for certain support activities such as meals served in food service facilities, jobs run by computer centers, and pounds of steam produced by heating plants.

Types and Classifications of Cost

Depending on the intended use of cost information, one type of cost or a combination of types of cost may be employed. Five basic types of cost are:

1. Historical cost.
2. Projected cost.
3. Standard cost.
4. Replacement cost.
5. Imputed cost.

For certain cost determination purposes, components of the above types of cost may be classified as either direct or indirect. For other cost determination purposes, components may be classified as fixed, variable, or semivariable.

Historical Cost. Historical cost usually is expressed in terms of the monetary value of economic resources released to pay faculty and staff salaries, to acquire materials and services, and to utilize facilities. Historical cost results from an expenditure involving the disbursement of cash or incurrence of a liability.

The two methods of determining historical cost are referred to as the cash basis and the accrual basis. The cash basis of accounting recognizes revenues when cash is received and expenditures when cash is paid, whereas accrual accounting recognizes revenues when earned and expenditures when materials are used and services are performed. To provide valid and consistent historical cost information, college and university accounting standards, as promulgated by authoritative bodies, require that accounting records and resulting financial statements be based on the accrual method of accounting. For cost determination purposes, the accrual basis should be used. In this regard, an important concept inherent in accounting and costing is materiality, which provides that it is not necessary to recognize certain items of expense and revenue if their omission does not have a significant effect on the final results.

Projected Cost. Projected cost for an educational institution is an estimate of the cost to be incurred in a future period. Changes anticipated in programs, student demand, faculty mix, faculty workload, support required, salary rates, and economic conditions all affect cost expectations. Projected cost is based on available knowledge about past activities, along with expectations of new and planned activities and the effect of changing conditions on cost.

Standard Cost. Standard cost is a predetermined cost, used as a target or basis of comparison with actual cost when units of service are provided. Establishment of standard cost involves a detailed examination of past occurrences and an evaluation of expectations to establish meaningful standards of performance. Standard costs may be developed by estimating costs based on historical experience or based on special studies.

Replacement Cost. Replacement cost refers to that cost which would be incurred at present or in the future to construct or acquire physical facilities or to purchase comparable services and materials to replace those obtained in the past. Replacement cost is not recorded as part of the financial accounting system. It may be used to measure the effects of inflation or deflation against the original cost incurred.

Cost viewed in terms of replacement highlights the fact that an institution is utilizing assets purchased in the past, which may be replaced at a cost different from historical cost. Because of changing price levels, recognition of historical cost alone may misrepresent the cost if replacement is considered. Therefore, since certain assets presumably will be replaced by an institution, replacement cost is measured at the current or future market level.

Imputed Cost. Imputed cost relates to potential resources that would have been available to an institution, but that were forgone because one alternative was chosen over another. Imputed cost does not consider the past, present, or eventual disbursement of cash or its equivalent, but rather is concerned with measuring the cost of alternative opportunities. By considering forgone resources as a cost, management is able to evaluate the imputed cost of one alternative versus another.

An example of imputed cost is the interest income forgone by an institution, which could have been earned if the funds utilized for a particular activity had been invested. This imputed cost represents economic resources forgone by an institution in selecting one alternative over another.

Direct Costs and Indirect Costs. For cost determination purposes, components of cost may be classified into direct costs and indirect costs. Direct costs are those expenses that are readily identifiable with a cost objective. For example, where the chemistry department is the cost objective, identifiable faculty compensation and supplies associated with teaching chemistry courses are direct costs of the department.

Indirect costs are those costs not readily identifiable with a cost objective. Indirect costs of a chemistry department include an allocated portion of the expenses of the president's office, libraries, and operation and maintenance of plant. These costs are incurred for more than one cost objective and are not readily related in a direct fashion to each cost objective.

The distinction between direct and indirect cost has to be judgmental in many cases. A major factor in distinguishing between direct and indirect cost is the level of aggregation of the cost objective. For instance, a portion of the compensation paid to a chemistry department chairman may be considered an indirect cost of a chemistry course. However, if the cost objective is the chemistry department as a whole, instead of the individual courses conducted by the department, the cost of the department chairman is direct.

The determination of whether cost is direct or indirect also is affected by the practicality of assigning costs directly to the cost objective to achieve greater precision. In many situations, much effort is required to relate cost directly to the cost objective, with the results not being materially different from the identification of cost as indirect. Therefore, an important factor for consideration in the assignment of costs is the added expense of identifying costs as direct rather than indirect. The expense of making a precise assignment of costs as direct must be weighed against the precision required in satisfying the purpose for which cost information is used.

Other factors affecting the distinction between direct and indirect cost include the individual judgments that must be exercised in classifying costs and the differences among institutions, such as organizational structure and operating policies.

Fixed, Variable, and Semivariable Costs. Components of cost also may be identified as being fixed, variable, or semivariable (also referred to as mixed or step-variable) costs. Total variable costs fluctuate in direct proportion to the volume of units of service provided. Total fixed costs, on the other hand, remain constant over a period regardless of the number of units of service provided. Semivariable costs include both fixed and variable elements, the fixed portion relating to capacity and the variable portion depending on usage. These semivariable costs typically react to volume changes in an irregular fashion; thus, cost that is fixed for a certain range of units of service becomes variable as that range is exceeded.

Certain costs are classified as fixed because of policy decisions of an institution, and may be further referred to as committed or discretionary. Committed fixed costs are those that must be expended because of existing contractual arrangements, plant facilities, and other activities that are necessary to maintain a viable program within the institution. For example, faculty compensation may be a committed cost because of employment contracts. Discretionary fixed costs (also referred to as managed costs) result directly from policy decisions of management. An example of discretionary cost is preventive maintenance. The incurrence of such costs has no relationship to volume of service, but because of their nature, may be adjusted within a particular costing period.

COSTING AND FINANCIAL ACCOUNTING

In the determination of cost information, there are important relationships between financial accounting and cost accounting that need to be recognized. A financial accounting system is used by all colleges and universities to provide information to administrators, governing boards, and others. The information obtained from this system, however, often cannot completely satisfy the needs for unit cost information. For specific purposes, cost information may be developed by conducting special cost studies, which typically utilize data contained in established financial accounting systems as well as financial and statistical data available from other sources. To meet the repetitive requirements for certain cost information, an institution may expand its financial accounting system or develop supplemental costing procedures. The distinguishing characteristic of cost accounting is the introduction of statistical data to determine unit costs.

A financial accounting system in higher education is based on generally accepted accounting principles and is designed to satisfy the institution's need for recording, collecting, classifying, and reporting financial information. This involves maintaining separate accounts in the financial accounting system for (1) the unrestricted and restricted funds received and expended by the institution; (2) the organizational entities within the institution responsible for expending funds according to budgets; and (3) the objects of expenditures incurred, such as salaries and wages, supplies, and equipment. The classification of different accounts is in accordance with the institution's chart of accounts. Except for the broad classifications of financial accounting information promulgated by authoritative bodies for external financial reporting purposes, the chart of accounts usually varies among institutions. The variations are due in part to differences in institutional characteristics and information requests.

Because a chart of accounts is designed to serve specific purposes, the information obtained from the financial accounting system usually does not satisfy the variety of needs for cost information. Expenditures such as interest on plant indebtedness recorded in certain fund groups for financial accounting purposes may have to be combined with expenditures of other fund groups for cost determination purposes. Furthermore, there are instances where the financial accounting system does not include certain costs such as retirement plan expense recorded by a state agency and depreciation expense, which is not required to be recognized by institutions of higher education.

Accounts in the financial accounting system may or may not coincide with cost objectives. In determining cost information, certain accounts in the financial accounting system may require analysis to identify their direct or indirect relationship to a cost objective or to identify their fixed, variable, or semivariable nature. Financial accounting information which cannot be directly identified with a cost objective may need to be allocated as an indirect cost. Similarly, the methods used to charge personnel costs to accounts for financial accounting purposes may not be sufficient bases for identifying costs to a cost objective for cost accounting purposes.

Reconciliation, the process of identifying and giving appropriate consideration to differences in two or more sets of data, should be made between cost information and official financial and statistical information. This reconciliation is necessary because cost accounting systems or special cost studies normally make some use of the following:

1. Costs appearing in different form from that contained in the financial accounting system.
2. Costs unavailable in the financial accounting system.
3. Statistical data available elsewhere in the institution or from other sources.

The reconciliation of these items is necessary to insure the validity of cost information.

As is true with the presentation of a financial statement, cost information reports should be accompanied by a disclosure statement sufficient to provide the reader with the significant costing standards and policies affecting the determination of the cost information for its intended purpose.

COST DETERMINATION METHODS AND APPROACHES

Cost objectives may represent either (1) specific, unique projects or (2) processes producing similar, repetitive services. The costs of such objectives are determined by one or a combination of two methods, namely, the specific service method or the continuous service method. Generally, under the specific service method, costs are accumulated to a specific service or project, while under the continuous service method they are accumulated to a group of similar units of service. In commercial organizations, these methods are referred to as job order and process costing, respectively. Selection of the appropriate costing method is essential if valid costs are to be determined. The continuous service method costs all units at an average as though the units were all uniform. If the services are unique and not uniform, use of the continuous service method would give invalid results.

Associated with these primary methods are three cost approaches, namely, full costing, variable costing, and standard costing, which can be used with both the specific service and continuous service methods.

Specific Service and Continuous Service Methods

Presented below are the characteristics and uses of each primary method, followed by a description of its applicability to institutions of higher education.

Specific Service Method. As the name implies, this cost determination method is used to collect cost incurred for a specific service, which can be identified separately. It is because each unit is unique that cost must be segregated, rather than being identified as part of a continuous process, wherein an average cost can be derived that is representative of each unit of service. In the specific service method, the costs of different units of service are accumulated individually throughout the period during which service is provided. As a result, costs are compiled by each project or job in each organizational unit.

Examples of specific services are research projects, jobs in print shops, and usage of motor vehicles. Each project or job has unique objectives requiring different amounts of personnel effort, goods and services, and other expenses to achieve the result intended when the project was conceived. For this reason the specific service method is used, which identifies costs of each project.

Continuous Service Method. The continuous service method is useful when the activities being costed consist of similar units of service. In this instance, the service being costed represents a number of uniform units the cost of which can be aggregated to arrive at an average cost per unit for a particular period. Service may be provided by a number of separate organizational units performing standard activities. Costs may be accumulated through various processes or organizational units until all services are completed.

The method for attributing cost under the continuous service method is comparable to the specific service method in that the cost resulting from expenditures or requisitions of supplies is determined on somewhat the same basis. A difference that does exist, however, is that the cost incurred is accumulated by process or organizational entity rather than by individual project.

An example of the use of the continuous service method is a department such as history, providing instructional services to majors in that discipline. Typically, the department also simultaneously provides instructional services to majors of other disciplines such as English and chemistry. Instructional services provided to these different majors are the same when they attend the same courses. Essentially, courses are designed to provide instructional services to students, according to a defined curriculum. Because of these characteristics, a continuous service cost method may be applied to determine a cost per unit of service provided to each student.

Selection of Method. As a general rule, the following guidelines may be employed to select the method to attribute cost:

1. Cost incurred by an organizational unit to provide a uniform service for a particular period should be accumulated as a single cost objective by the continuous service method.
2. Cost incurred by an organizational unit to provide more than one uniform service for a particular period should be accumulated as more than one cost objective by the continuous service method.
3. Cost incurred by an organizational unit with different services that can be separately identified should be accumulated by the specific service method.
4. Cost incurred by an organizational unit to provide one or more uniform services and one or more different services can be accumulated concurrently or in sequence by both the continuous service method and specific service method, respectively.

Cost Approaches

Full, variable, and standard costing, as previously indicated, are approaches to cost determination that are used in conjunction with either of the primary methods discussed previously. Selection of the cost approach is determined by the purpose for which cost information is to be used.

Full Costing. Full costing is defined as the accumulation of all direct and all indirect costs attributed to units of service. The full costing approach permits the user of cost information to examine the total cost of units of service as well as direct and indirect components of cost that make up the full cost. The full costing approach requires that all direct costs and an appropriate share of indirect costs incurred by an organizational unit (such as an academic department) be included as the cost of units of service. Other indirect costs incurred by the institution also must be considered when determining full cost. These include indirect support activity costs, such as the cost of the president's office and operation and maintenance of plant, which cannot be attributed directly to the units of service being costed.

Full costs also include depreciation expense. Depreciation expense is that portion of the cost of limited-life capital assets (buildings and equipment) which expires during a period. In higher education, financial accounting standards do not require recognition of depreciation; however, if an institution chooses to determine full costs, provision should be made for depreciation expense. There are instances when an institution, in accordance with its costing purposes, may desire to exclude expired capital costs, but the results would not represent full costs.

Full costs also should include direct benefits of a material nature provided by an outside organization, such as pension expense incurred by a state, but not recorded in an institution's financial records.

In colleges and universities, information derived from the full costing approach may be used to compare and examine periodically the cost and revenue per unit of service provided. Full cost information may assist in (1) determining whether tuition, fees, appropriation requests, and revenues from other sources warrant adjustment and (2) evaluating whether funds expended produced the benefits anticipated. Full-cost procedures should be used for cost determination of sponsored projects.

Variable Costing. Variable costing recognizes as the cost of services provided only those costs which are variable, that is, those costs which change when changes occur in service volume or mix. Costs that remain constant, regardless of the number of units of service provided, are referred to as fixed costs.

Full costing encompasses the assignment of all costs, regardless of their variability to the units of service provided, whereas variable costing assigns only those costs that vary with volume or mix. Variable costs include those direct and indirect costs that vary with the number of units of service provided or within a range of activity.

In using the variable costing approach, costs incurred by an organizational unit are classified as either fixed or variable. For instance, if a program were to be added or eliminated, it would be necessary to determine how the costs of faculty salaries, departmental administrative salaries, and supplies would vary as a result of an increasing or decreasing number of units of service to be provided. Aggregate faculty salary cost may increase because additional sections may be required for a new program. If a program is eliminated, faculty cost may or may not decrease, depending on tenure conditions and on existing contractual obligations to nontenured faculty members. In the case of departmental administration, salary cost may be fixed because an anticipated increase or decrease in units of service may not require a change in administrative effort. On the other hand, cost of supplies may vary depending on the number of units of service. Determining the expected variability of these elements of cost is important in examining the financial implications of decisions being considered.

Variable costing is of particular import to an institution when the typical "what if" questions are asked. For instance, the financial impact of different alternatives under consideration might involve the following questions:

1. What if an academic program is expanded or contracted?
2. What if faculty salaries are raised?
3. What if average class size is increased or decreased?
4. What if the number of chemistry and history courses are reduced, with a corresponding increase in the number of English courses?
5. What if enrollments increase or decrease?

Standard Costing. Standard costing uses predetermined unit costs, which are compared with actual unit costs to identify variances. For example, in analyzing operation and maintenance of plant, variances from standard costs assist in focusing attention on variations from plan or budget and in determining corrective action to be taken. Standard costing is also useful in preparing plans and budgets for both management and those performing the work.

INDIRECT COST ALLOCATION

This section describes the considerations involved when indirect costs are to be allocated to cost objectives.

Indirect Cost Pools

Indirect cost pools are established for the purpose of allocating costs on a common allocation basis to a group of cost objectives benefiting from or causing the incurrence of the indirect cost. Indirect costs may be aggregated into pools by (1) organizational unit or cost center; (2) expenditure object, such as fuel and electricity; or (3) other categories. The number and composition of indirect cost pools relate to the characteristics of an individual institution. Factors used in determining indirect cost pool classifications include the purposes for which cost information is to be used, characteristics of the cost objectives being costed, complexity of the organization, and degree of accuracy needed.

Equitable Allocations

Cost accumulated in indirect cost pools should be allocated to cost objectives in an equitable manner. An equitable allocation basis relates to the benefits received by the cost objective or to the activities of the cost objective that logically and reasonably caused the cost to occur.

Selection of Allocation Bases

The bases selected for allocating indirect costs should be quantitative measures that can be applied in a practical manner. Such measures may be total direct costs, direct salaries and wages, square feet of space occupied, population of students and/or faculty served, or others as appropriate for the particular cost pool being allocated. The measure selected can be developed as part of a system designed to collect statistical data throughout the period or as a result of a special study.

The measure selected for distributing indirect cost should be one that will result in the most equitable allocation of indirect cost to the cost objective within the realm of practicability. After considering the purpose of cost determination, the most equitable method may not be the most reasonable in terms of both time and cost involved in collecting and tabulating quantitative data. For this reason the most practical cost distribution base should be employed, provided the result will not be materially different from a more complex alternative.

Common Cost

In processes in which two or more services are provided simultaneously, common costs occur in providing these services. In order to allocate equitably the common cost incurred in a single process to the services provided, a determination of the interrelationship between or among the two or more services involved in a given cost objective must be made. When the services are of similar importance, the process may be referred to as a joint service. Alternatively, when one service is incidental to the other, the process is one of primary-secondary service. This distinction and analysis should be made so that cost incurred in the process can be distributed equitably to the joint services or the primary-secondary services.

Joint Services. Joint services have one or more of the following characteristics:

1. The services are complementary in the sense that providing one results in providing the other.
2. The services are substitute in the sense that increasing one decreases the other.
3. The services are independent in the sense that there is no relationship between or among them except that it is less costly to provide them together rather than separately.

Allocation of cost to each of the joint services is based on a method that treats each service equitably by proportional distribution of cost. For instance, joint service cost may be allocated to the resulting services on the basis of units of each service.

One of the most difficult problems in determining joint service costs is the inseparable nature of many joint services. For example, the research function is an integral part of the instruction function, particularly at the graduate and professional levels. Medical schools have a very complex joint service problem arising from the inseparable nature of instruction, research, and patient care. In such situations, any separation of cost for joint services usually will be subjective.

Primary-Secondary Services. Primary services (main services) are the principal services of the process being costed. Secondary services (by-product services) are produced with a primary service and by the same process. The distinguishing characteristic of a secondary service is its minor importance in relation to the primary service.

Allocation of costs applicable to secondary services is handled in one of two basic ways.

1. No cost allocation is made to the secondary service, and revenue derived therefrom, if any, either is used to reduce the cost of primary service or is treated as other revenue, with no reduction in the cost of primary service.
2. Appropriate costs are allocated to the secondary service.

An example of primary-secondary services would be the academic services of a forestry school and the related forest products available for disposal. Such products are often sold to outside users, but are not a primary reason for the institution to have the forestry school. In this case, no cost would have to be allocated to the secondary service, with earned revenue either used to reduce the cost of primary services or treated as other revenue. As an alternative, a portion of the total operating cost of the forestry school may be allocated to the secondary service.

COST ANALYSIS

Once the purposes of obtaining cost information have been identified and costs have been determined, cost analysis can be performed. The act of performing cost analysis involves the examination and evaluation of costs and related statistical information in order to determine the implications of past, present, and future actions. Although cost analysis can consider past and present actions alone, one of its major uses is that of providing cost information concerning alternative opportunities available and assisting in the selection of those alternatives considered appropriate.

In performing cost analysis in higher education, it may be important in certain cases to differentiate between expenditures financed from restricted funds and those financed from unrestricted funds. This distinction must often be considered when using cost information because restricted funds can be used only for specific purposes and can be terminated at a specific time or at the completion of an activity. Where these factors are of some significance to institutions having large amounts of sponsored projects or restricted grants, it may be useful for unrestricted and restricted costs to be separately identified throughout the cost determination process. For more information on restricted and unrestricted funds, refer to the chapter "Current Funds." (See Publisher's Note on page 19.)

While there are innumerable analyses that may be made of cost information, three basic categories of cost analysis are full cost analysis, cost-volume-revenue analysis, and controllable cost analysis. The particular category of cost analysis to be applied is a chief factor in the selection of one of three costing approaches—full, variable, and standard costing.

Full Cost Analysis

Full cost analysis involves the process of examining and evaluating the total cost attributable to a cost objective. This type of cost analysis may be useful in establishing funding and price structures in higher education for such items as tuition and fees, appropriation requests, and recovery of grant and contract costs. It also may be used in examining and evaluating the historical cost performance of activities and in cost benefit analysis. In utilizing full cost analysis, it is generally useful to consider the component parts of full costs.

It should be noted that the use of average cost per unit of service in full cost analysis is limited for projecting future costs because cost variations resulting from volume changes do not follow the average. More than likely, future average costs will indeed be different from the present level, as the mix changes and the number of units provided increases or decreases. When costs are to be used for projections, it is necessary to consider the fixed and variable nature of the cost components.

Cost-Volume-Revenue Analysis (Differential Analysis)

Cost-volume-revenue analysis involves the relationship among the cost of service, number of units of service provided, and revenue derived from providing such service. This type of analysis presents the financial results anticipated for particular levels of activities or alternatives being considered. Emphasis is placed on examining cost, volume, and revenue, which can be different for alternative activities and for varying levels of units of service provided. For instance, instructional cost in a college or university is affected by changes in student requirements, course offerings, section size, cost of goods and services purchased, and teaching loads. Revenue is affected by the number of students enrolled, tuition and fee rates, and other factors. Since all costs do not vary with volume, analysis is required to identify variable and fixed costs. The variable costing approach to cost determination described earlier is used to perform this type of analysis. Cost-volume-revenue analysis assists in determining the effect of alternatives on revenue and cost.

Differential cost-revenue analysis (often referred to as incremental analysis) is a type of cost-volume-revenue analysis that assists in making choices among various volume alternatives. Differential costs and revenues are costs and revenues expected to change as a result of changes being considered in existing institutional activities. They are the summation of a series of marginal costs and revenues. Marginal cost and revenue refer to the change resulting from the addition of one unit of service.

Emphasis in differential analysis is directed toward examining those cost and revenue elements that will change and the changes in the amount of cost and revenue that will occur as a result of selecting one alternative over another. Similar useful analysis can be performed by relating changes in cost to changes in volume without reference to revenue changes.

Controllable Cost Analysis

Controllable cost analysis, which uses information normally derived from an institution's financial accounting records, involves the examination of those costs that are the assigned responsibility of the manager of an organizational entity. In institutions of higher education, as in other organizations, controllable costs are related to organizational entities so that accountability for the use of resources is identified with a manager.

In this analysis, actual costs are compared to projected (budgeted) or standard costs to determine variances. Analysis may indicate that variances were caused by the actions of a manager, and thus it may be determined that the manager should adjust subsequent expenditures to insure conformance to budgeted cost. Where variances resulted from circumstances beyond that manager's control, the causes may be attributed to: (1) volume changes, such as an increase or decrease from that planned in the number of students requiring room and board; (2) institutional policy decisions requiring a different level of service than originally intended; or (3) the environmental effect on cost, such as that experienced with rapidly changing utility rates. Variances caused by these factors may necessitate an adjustment in the manager's budgeted cost so as to establish a new level of controllable cost, which the manager is responsible for achieving.

COSTING ISSUES

Cost data of various kinds are being used more than ever by colleges and universities for internal management purposes. Furthermore, external agencies, such as state legislatures and local government bodies, increasingly are turning to cost-based formulas to determine the level of funding to be provided to institutions. An important question for both internal and external parties is: How can more and improved cost information be provided in a way that will improve the decision-making process in higher education? Before this question can be answered conclusively, a considerable amount of research should be performed.

This section describes the more significant cost determination issues facing higher education. Some of these issues require extensive definition, testing, and validation of results before they can be resolved.

Quality and Efficiency

There is considerable interest in finding ways to appraise the quality of educational programs in higher education; however, there are no generally accepted measures of quality. Some factors that may affect the quality of educational programs have been identified as the academic ability of students, the effectiveness of faculty, the financial support for programs, and the availability of physical facilities. While there may be a relationship between cost and quality, it is not appropriate to measure quality by using cost information.

There is also interest in measuring the efficiency of educational programs; however, no acceptable measures are available. Some institutions attempt to use average class size data, student credit-hours-taught data, and classroom utilization data as measures of efficiency.

Judgment is often introduced as a substitute for quantifiable measures of quality and efficiency. Such judgment can be based on prior experiences, defined educational priorities, student and faculty demands, and other factors influencing decisions concerning educational programs. It is inappropriate for users of cost information to assume that the higher the cost of a particular program, the higher its quality; or the lower the cost of a program, the greater its efficiency. The cost of a program cannot be assumed to be a measure of its quality or efficiency.

Faculty Time and Effort Reporting

There is a long-standing issue in determining costs in higher education, which involves the appropriate distribution of faculty time or effort to the instruction, research, and public service functions. This distribution is necessary to attribute compensation cost to those functions benefiting from faculty activities.

The first aspect of this issue involves the use of time or the use of effort information as the basis for making a cost distribution. Time involves the number of hours expended, while effort involves the intensity of activity. If the distribution of faculty compensation is based on time information, cost results probably will be different from what they would be if the distribution were based on effort information.

Another aspect in faculty time or effort reporting involves the question of common cost. This difficulty can best be illustrated by the example of a professor who has a sponsored research project and in the conduct of research also provides instructional assistance to a graduate student enrolled in one of his courses. The issue is one of distributing the professor's time or effort to determine the cost of instruction and the cost of research when they occur simultaneously. A possible resolution of this issue lies in reaching consensus on a procedure for an equitable assignment of faculty time or effort. Such a resolution may well be subjective, however, and would require acceptance by a number of concerned groups, including those outside the institution who provide funds.

Costing Units

While it is possible to measure the inputs of higher education activities, there is no general agreement on the definition of measures of output for instruction, research, and public service. In the absence of acceptable output measures, many institutions have substituted measures of the process for costing units.

The definitions of costing units may vary within an institution and from institution to institution, which results in variations in unit cost information. For instance, within a university a general definition of the semester credit-hour may be established, but a particular school in the same university may decide to use a different credit-hour definition for its own purposes. Similarly, the definition of the student credit-hour can vary among institutions depending on whether they are counted at registration, after the drop/add period, or at the end of the semester. These costing unit difficulties will have to be resolved in order to report cost information in a uniform manner.

Formula Funding

Much attention has focused on the development of unit cost information as the basis of formula funding from government agencies. Many state legislatures and local government bodies are asking basic questions such as: How much funding is required for higher education and how should funds be allocated, recognizing that institutions provide different programs and services?

A number of states and local governments have attempted to resolve such questions by developing allocation formulas that involve numerous factors, including unit cost information. The equitableness of allocations resulting from these formulas depends on how well the formulas approximate the real funding needs of the institution, as well as the accuracy and validity of the data used in these formulas. It must be recognized that programs with similar titles may have significantly different costs because of differences in terms of purpose, scope, quality, and efficiency. Analysis of program differences, including cost and non-cost aspects, should be a factor in the development and use of a formula if the resulting distribution of funds is to be equitable.

Interinstitutional Comparisons and Analyses of Cost Information

Some institutional administrators and certain external agency representatives have suggested that interinstitutional comparisons and analyses of cost information are useful for evaluating programs and related activities and for allocating resources both within and among institutions. In using cost in this manner, however, it is evident that there are differences among institutions of higher education that affect the validity of cost information for comparison purposes. These differences may be classified as methodological or functional. When performing a cost study for purposes of interinstitutional cost comparisons and analyses, it is necessary to attempt to eliminate methodological cost determination differences so that the resulting cost information highlights only functional differences.

Methodological differences result from costing procedures that are not uniformly applied. Typical examples of methodological differences are the following:

1. The judgments exercised in collecting, estimating, and allocating costs differ since they often depend on the interpretation of complex situations and on the unique characteristics of individual institutions. For instance, experience has indicated that there are no generally accepted bases suitable for all allocations of indirect cost.
2. The definition of direct and indirect cost can be different from institution to institution, depending on the ability of an institution to identify cost as direct.
3. The methods used to accumulate and analyze cost may differ from institution to institution.

Functional differences principally result from differences in programs and related support activities. Identifying the actual cause of such differences among institutions requires an analysis of the characteristics and content of programs being compared. The following are examples of functional differences affecting the comparison and analysis of cost information:

1. Missions, goals, and objectives differ among institutions.
2. Quality and efficiency of the educational process differ among institutions.
3. Organizational structure, activities, and units of service costed differ from institution to institution.
4. Constituents served by institutions have different needs and, therefore, require different education services.
5. Different geographical locations of institutions cause cost for similar items to vary.
6. Distinct differences exist between those institutions which are well established and those which are developing.
7. Economies of scale may be available to a larger institution and not to a smaller one.
8. Variations in costs occur because of differences in the availability of funds.

If methodological differences can be eliminated and true functional differences identified, the question remains as to how cost information should be used internally by management and externally by government agencies. Can adequate analysis of the relationship of differences in cost to functional differences be developed to permit valid and equitable decisions? Comparative analysis is less difficult when dealing with like institutions, but becomes progressively more difficult as comparisons are made among dissimilar institutions. Much study is required to prove the utility of interinstitutional cost information.

COSTING STANDARDS

The term "costing standards" as used here refers to principles that should be applied in determining cost. Costing standards constitute the framework or foundation on which costing is performed. Because costing standards are basic definitions of how costs should be determined, they provide a better understanding of the meaning and applications of costing.

Costing standards facilitate a more consistent determination of cost; however, the application of these standards will not insure uniform determination of cost information, because judgmental and other factors are involved in the costing process. Costing standards provide criteria for the selection of costing alternatives that are valid in terms of their justification of cost accumulation and allocation within a conceptual foundation of cost accounting theory.

The development of costing standards is an evolving process and additional standards may be added from time to time as more study is given to this complex subject.

Costing Standard #1

THE PURPOSES FOR WHICH COST INFORMATION IS TO BE USED SHOULD DETERMINE THE FRAMEWORK WITHIN WHICH COST INFORMATION IS DEVELOPED

Costs are determined to satisfy specific purposes for which cost information is needed. A clear definition of these purposes is needed in order to specify the cost determination approach to be used.

Costing Standard #2

COST INFORMATION SHOULD BE BASED ON THE ACCRUAL METHOD OF ACCOUNTING

Two methods of determining cost are the cash basis method and the accrual basis method. The cash basis method of accounting recognizes expenditures when cash is paid, whereas accrual accounting recognizes expenditures when materials are used and services are performed. To provide valid and consistent cost, the accrual method of accounting should be used, applying the concept of materiality.

Costing Standard #3

COST DATA SHOULD BE RECONCILABLE TO OFFICIAL FINANCIAL ACCOUNTING DATA

Reconciliation to official financial accounting records is necessary to insure the validity of cost records. (Reconciliation is the process of identifying and giving appropriate consideration to differences in two or more sets of data.)

Costing Standard #4

NONFINANCIAL DATA SHOULD BE RECONCILABLE TO OFFICIAL INSTITUTIONAL RECORDS

Reconciliation of nonfinancial data to the official records of the institution is necessary to insure the validity of cost data when such nonfinancial data are used in the cost determination process. (Reconciliation is the process of identifying and giving appropriate consideration to differences in two or more sets of data.)

Costing Standard #5

DEFINITIONS USED IN COST DETERMINATIONS SHOULD BE APPLIED UNIFORMLY

Uniform definitions should be employed during the cost determination process and from period to period to achieve reliable cost information.

Costing Standard #6

COST INFORMATION AND RELATED COSTING UNITS SHOULD COVER THE SAME PERIOD

Cost determination for a particular period should be related to the units of service provided during that same period.

Costing Standard #7

COST INFORMATION SHOULD BE CONSISTENTLY DETERMINED

Cost information used in any cost study must be consistently determined for all periods included and for all organizational units included. Cost data will not be comparable unless consistently determined. Consistency depends on uniform definitions, methods, and interpretations as well as judgments exercised in the cost determination process.

Costing Standard #8

COST SHOULD BE ATTRIBUTED TO A COST OBJECTIVE BASED ON A CAUSAL OR BENEFICIAL RELATIONSHIP

Meaningful and dependable cost determinations require that costs be assigned to cost objectives according to identifiable relationships that logically and reasonably cause the cost to occur or that result in benefits received by the cost objective.

Costing Standard #9

INDIRECT COST SHOULD BE ALLOCATED BASED ON QUANTITATIVE MEASURES THAT CAN BE APPLIED IN A PRACTICAL MANNER

The bases of allocation of indirect cost should involve the use of those quantitative measures which best represent the relationship of cost to the cost objective, with the result that indirect costs are equitably distributed. There are instances when the most equitable distribution may not be the most practical, both in terms of time and related expense involved in collecting and tabulating quantitative measures. In such cases, the most practical measure should be selected, provided the results are not materially different.

Costing Standard# 10

COMMON COST INCURRED TO PROVIDE TWO OR MORE SERVICES SHOULD BE ALLOCATED IN AN EQUITABLE MANNER

Allocation of common costs to joint services, which are cost objectives, should be based on a logical relationship of the several services to one another and to the nature and circumstances of the costs incurred. It should be recognized that separate costing of jointly produced services is subjective and the bases available to allocate joint costs are arbitrary.

Costing Standard #11

CAPITAL COST OF A COST OBJECTIVE SHOULD REFLECT THE APPLICABLE EXPIRED CAPITAL COST OF THE PERIOD

Capital cost of a cost objective should reflect applicable expired cost determined on the basis of the estimated useful life of the asset being depreciated.

Costing Standard #12

COST INFORMATION SHOULD BE ACCOMPANIED BY A DISCLOSURE STATEMENT

Explanatory disclosures necessary to provide the user with a clear understanding of the previously established, intended use of cost information should accompany the reporting of such information. Disclosures should encompass the costing method and approach used, the cost definition used, the types of cost included, identification of cost objectives and costing units, and other information pertinent to the cost determination effort.

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